

Exploring weather trends

Presented

By

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Outline:**Tools used for each step:**

- a. SQL query was used to extract data from the database and downloaded as a CSV file.
- b. The downloaded file was uploaded to Google sheet where the moving average was calculated
- c. A line chart was used to show the visualization.

Querying the database:

SQL query was used to query the database.

- a. The city_data in the database was extracted by running the following SQL query:

```
SELECT *  
  
FROM city_data  
  
WHERE country LIKE '%Nigeria%' AND city LIKE '%Port Harcourt%' AND avg_temp !=  
0  
  
ORDER BY year DESC, avg_temp;
```

As is obvious, the choice for avg_temp !=0 was to eliminate the case of empty cells in the years with null average temperature while at the same time making provision for cases where there could be negative temperatures.

I chose to sort by year descending so as to figure the maximum and minimum years of my city's average temperatures in order to limit the global years to those of my city. I made this decision because I didn't see any sense in comparing an existing data with a none-existing data.

- b. The global_data in the database was extracted by running the following SQL query based on my city's maximum and minimum years:

```
SELECT *  
  
FROM global_data  
  
WHERE year >= 1856 AND year <= 2013 AND avg_temp != 0  
  
ORDER BY year DESC, avg_temp;
```

I also chose to sort by year descending in the query for global data so as to keep things uniform.

Calculation of moving average:

A 5 year moving average was calculated for both the average global temperature and Port Harcourt average temperature. There was a tradeoff between the numbers of years used for moving average and how noisy the detail should be.

year	global-avg-temp	city Name	country	Pt-Harct-avg-tem	5-yr-global-MA	5-yr-Pt-Harct-MA	city	Washgton-avg-te	5-yr-Washgton-MA
2013	9.61	Port Harcourt	Nigeria	27.24			Washington	14.19	
2012	9.51	Port Harcourt	Nigeria	27			Washington	14	
2011	9.52	Port Harcourt	Nigeria	27.18			Washington	13.56	
2010	9.7	Port Harcourt	Nigeria	27.49			Washington	13.28	
2009	9.51	Port Harcourt	Nigeria	27.45	9.57	27.272	Washington	12.44	13.494
2008	9.43	Port Harcourt	Nigeria	27.18	9.534	27.26	Washington	12.76	13.208
2007	9.73	Port Harcourt	Nigeria	27.32	9.578	27.324	Washington	13.13	13.034
2006	9.53	Port Harcourt	Nigeria	27.29	9.58	27.346	Washington	13.59	13.04
2005	9.7	Port Harcourt	Nigeria	27.16	9.58	27.28	Washington	12.82	12.948
2004	9.32	Port Harcourt	Nigeria	27.19	9.542	27.228	Washington	12.79	13.018
2003	9.53	Port Harcourt	Nigeria	27.13	9.562	27.218	Washington	12.07	12.88
2002	9.57	Port Harcourt	Nigeria	27.01	9.53	27.156	Washington	13.46	12.946
2001	9.41	Port Harcourt	Nigeria	26.67	9.506	27.032	Washington	12.99	12.826
2000	9.2	Port Harcourt	Nigeria	26.76	9.406	26.952	Washington	12.28	12.718
1999	9.29	Port Harcourt	Nigeria	26.74	9.4	26.862	Washington	13.19	12.798
1998	9.52	Port Harcourt	Nigeria	27.41	9.398	26.918	Washington	14.07	13.198
1997	9.2	Port Harcourt	Nigeria	26.76	9.324	26.868	Washington	12.36	12.978
1996	9.04	Port Harcourt	Nigeria	26.77	9.25	26.888	Washington	11.85	12.75
1995	9.35	Port Harcourt	Nigeria	26.97	9.28	26.93	Washington	12.55	12.804
1994	9.04	Port Harcourt	Nigeria	26.69	9.23	26.92	Washington	12.46	12.658
1993	8.87	Port Harcourt	Nigeria	26.7	9.1	26.778	Washington	12.39	12.322
1992	8.84	Port Harcourt	Nigeria	26.49	9.028	26.724	Washington	11.96	12.242
1991	9.18	Port Harcourt	Nigeria	26.8	9.056	26.73	Washington	13.76	12.624
1990	9.23	Port Harcourt	Nigeria	26.84	9.032	26.704	Washington	13.75	12.864
1989	8.92	Port Harcourt	Nigeria	26.43	9.008	26.652	Washington	11.92	12.756
1988	9.2	Port Harcourt	Nigeria	26.85	9.074	26.682	Washington	12.14	12.706
1987	8.99	Port Harcourt	Nigeria	27.11	9.104	26.806	Washington	12.78	12.87
1986	8.83	Port Harcourt	Nigeria	26.49	9.034	26.744	Washington	12.65	12.648
1985	8.66	Port Harcourt	Nigeria	26.55	8.92	26.686	Washington	12.79	12.456
1984	8.69	Port Harcourt	Nigeria	26.75	8.874	26.75	Washington	12.42	12.556
1983	9.03	Port Harcourt	Nigeria	26.65	8.84	26.71	Washington	12.48	12.624

1982	8.64	Port Harcourt	Nigeria	26.43	8.77	26.574	Washington	12.16	12.5
1981	9.17	Port Harcourt	Nigeria	26.42	8.838	26.56	Washington	12	12.37
1980	8.98	Port Harcourt	Nigeria	26.79	8.902	26.608	Washington	12.22	12.256
1979	8.73	Port Harcourt	Nigeria	26.86	8.91	26.63	Washington	11.88	12.148
1978	8.69	Port Harcourt	Nigeria	26.62	8.842	26.624	Washington	11.56	11.964
1977	8.85	Port Harcourt	Nigeria	26.79	8.884	26.696	Washington	12.34	12
1976	8.35	Port Harcourt	Nigeria	26.28	8.72	26.668	Washington	11.85	11.97
1975	8.74	Port Harcourt	Nigeria	26.27	8.672	26.564	Washington	12.67	12.06
1974	8.47	Port Harcourt	Nigeria	26.38	8.62	26.468	Washington	12.51	12.186
1973	8.95	Port Harcourt	Nigeria	26.98	8.672	26.54	Washington	13.04	12.482
1972	8.5	Port Harcourt	Nigeria	26.62	8.602	26.506	Washington	11.89	12.392
1971	8.6	Port Harcourt	Nigeria	26.41	8.652	26.532	Washington	12.43	12.508
1970	8.7	Port Harcourt	Nigeria	26.65	8.644	26.608	Washington	12.29	12.432
1969	8.6	Port Harcourt	Nigeria	26.66	8.67	26.664	Washington	11.98	12.326
1968	8.52	Port Harcourt	Nigeria	26.51	8.584	26.57	Washington	12.15	12.148
1967	8.7	Port Harcourt	Nigeria	26.48	8.624	26.542	Washington	11.6	12.09
1966	8.6	Port Harcourt	Nigeria	26.75	8.624	26.61	Washington	11.89	11.982
1965	8.53	Port Harcourt	Nigeria	26.42	8.59	26.564	Washington	12.18	11.96
1964	8.41	Port Harcourt	Nigeria	26.42	8.552	26.516	Washington	12.33	12.03
1963	8.86	Port Harcourt	Nigeria	26.81	8.62	26.576	Washington	11.58	11.916
1962	8.75	Port Harcourt	Nigeria	26.46	8.63	26.572	Washington	11.61	11.918
1961	8.8	Port Harcourt	Nigeria	26.41	8.67	26.504	Washington	12.11	11.962
1960	8.58	Port Harcourt	Nigeria	26.59	8.68	26.538	Washington	11.78	11.882
1959	8.73	Port Harcourt	Nigeria	26.55	8.744	26.564	Washington	13.06	12.028
1958	8.77	Port Harcourt	Nigeria	26.52	8.726	26.506	Washington	11.34	11.98
1957	8.73	Port Harcourt	Nigeria	26.55	8.722	26.524	Washington	12.74	12.206
1956	8.28	Port Harcourt	Nigeria	26.08	8.618	26.458	Washington	12.3	12.244
1955	8.63	Port Harcourt	Nigeria	26.29	8.628	26.398	Washington	12.48	12.384
1954	8.56	Port Harcourt	Nigeria	26.18	8.594	26.324	Washington	12.69	12.31
1953	8.87	Port Harcourt	Nigeria	26.54	8.614	26.328	Washington	13.29	12.7
1952	8.64	Port Harcourt	Nigeria	26.54	8.596	26.326	Washington	12.63	12.678

1951	8.63	Port Harcourt	Nigeria	26.62	8.666	26.434	Washington	12.37	12.692
1950	8.37	Port Harcourt	Nigeria	26.52	8.614	26.48	Washington	12.04	12.604
1949	8.59	Port Harcourt	Nigeria	26.87	8.62	26.618	Washington	13.37	12.74
1948	8.75	Port Harcourt	Nigeria	26.55	8.596	26.62	Washington	12.2	12.522
1947	8.8	Port Harcourt	Nigeria	26.83	8.628	26.678	Washington	12.06	12.408
1946	8.68	Port Harcourt	Nigeria	26.64	8.638	26.682	Washington	12.88	12.51
1945	8.58	Port Harcourt	Nigeria	26.88	8.68	26.754	Washington	12.31	12.564
1944	8.85	Port Harcourt	Nigeria	26.82	8.732	26.744	Washington	12.27	12.344
1943	8.76	Port Harcourt	Nigeria	26.44	8.734	26.722	Washington	12.24	12.352
1942	8.73	Port Harcourt	Nigeria	26.81	8.72	26.718	Washington	12.4	12.42
1941	8.77	Port Harcourt	Nigeria	27.17	8.738	26.824	Washington	12.58	12.36
1940	8.76	Port Harcourt	Nigeria	26.59	8.774	26.766	Washington	11.02	12.102
1939	8.76	Port Harcourt	Nigeria	26.37	8.756	26.676	Washington	12.75	12.198
1938	8.86	Port Harcourt	Nigeria	26.91	8.776	26.77	Washington	12.79	12.308
1937	8.7	Port Harcourt	Nigeria	26.94	8.77	26.796	Washington	12.23	12.274
1936	8.55	Port Harcourt	Nigeria	26.71	8.726	26.704	Washington	12	12.158
1935	8.52	Port Harcourt	Nigeria	26.77	8.678	26.74	Washington	11.81	12.316
1934	8.63	Port Harcourt	Nigeria	26.76	8.652	26.818	Washington	11.98	12.162
1933	8.34	Port Harcourt	Nigeria	26.81	8.548	26.798	Washington	12.6	12.124
1932	8.71	Port Harcourt	Nigeria	26.38	8.55	26.686	Washington	12.75	12.228
1931	8.72	Port Harcourt	Nigeria	26.55	8.584	26.654	Washington	13.26	12.48
1930	8.63	Port Harcourt	Nigeria	26.54	8.606	26.608	Washington	12.64	12.646
1929	8.24	Port Harcourt	Nigeria	26.42	8.528	26.54	Washington	12.13	12.676
1928	8.63	Port Harcourt	Nigeria	26.35	8.586	26.448	Washington	11.94	12.544
1927	8.52	Port Harcourt	Nigeria	26.85	8.548	26.542	Washington	12.15	12.424
1926	8.73	Port Harcourt	Nigeria	26.59	8.55	26.55	Washington	11.25	12.022
1925	8.53	Port Harcourt	Nigeria	26.1	8.53	26.462	Washington	12.13	11.92
1924	8.51	Port Harcourt	Nigeria	26.75	8.584	26.528	Washington	11.13	11.72
1923	8.42	Port Harcourt	Nigeria	26.32	8.542	26.522	Washington	12.17	11.766
1922	8.41	Port Harcourt	Nigeria	26.49	8.52	26.45	Washington	12.46	11.828
1921	8.57	Port Harcourt	Nigeria	26.51	8.488	26.434	Washington	13.37	12.252

1920	8.36	Port Harcourt	Nigeria	26.44	8.454	26.502	Washington	11.4	12.106
1919	8.38	Port Harcourt	Nigeria	26.76	8.428	26.504	Washington	12.37	12.354
1918	8.13	Port Harcourt	Nigeria	26.1	8.37	26.46	Washington	11.86	12.292
1917	8.02	Port Harcourt	Nigeria	26.67	8.292	26.496	Washington	10.55	11.91
1916	8.23	Port Harcourt	Nigeria	26.41	8.224	26.476	Washington	11.6	11.556
1915	8.59	Port Harcourt	Nigeria	26.54	8.27	26.496	Washington	11.92	11.66
1914	8.59	Port Harcourt	Nigeria	26.61	8.312	26.466	Washington	11.61	11.508
1913	8.3	Port Harcourt	Nigeria	26.68	8.346	26.582	Washington	12.98	11.732
1912	8.17	Port Harcourt	Nigeria	26.27	8.376	26.502	Washington	11.49	11.92
1911	8.18	Port Harcourt	Nigeria	25.63	8.366	26.346	Washington	12.53	12.106
1910	8.22	Port Harcourt	Nigeria	25.97	8.292	26.232	Washington	11.89	12.1
1909	8.18	Port Harcourt	Nigeria	25.91	8.21	26.092	Washington	11.93	12.164
1908	8.19	Port Harcourt	Nigeria	25.98	8.188	25.952	Washington	12.06	11.98
1907	7.95	Port Harcourt	Nigeria	25.89	8.144	25.876	Washington	10.87	11.856
1906	8.38	Port Harcourt	Nigeria	25.97	8.184	25.944	Washington	12.34	11.818
1905	8.23	Port Harcourt	Nigeria	26.15	8.186	25.98	Washington	11.49	11.738
1904	8.09	Port Harcourt	Nigeria	25.19	8.168	25.836	Washington	10.37	11.426
1903	8.22	Port Harcourt	Nigeria	25.64	8.174	25.768	Washington	11.57	11.328
1902	8.3	Port Harcourt	Nigeria	25.84	8.244	25.758	Washington	11.76	11.506
1901	8.54	Port Harcourt	Nigeria	26.3	8.276	25.824	Washington	11.32	11.302
1900	8.5	Port Harcourt	Nigeria	26.23	8.33	25.84	Washington	12.71	11.546
1899	8.4	Port Harcourt	Nigeria	26.25	8.392	26.052	Washington	11.73	11.818
1898	8.18	Port Harcourt	Nigeria	25.58	8.384	26.04	Washington	12.55	12.014
1897	8.29	Port Harcourt	Nigeria	26.14	8.382	26.1	Washington	11.81	12.024
1896	8.21	Port Harcourt	Nigeria	25.74	8.316	25.988	Washington	12.15	12.19
1895	8.15	Port Harcourt	Nigeria	25.77	8.246	25.896	Washington	11.37	11.922
1894	8.16	Port Harcourt	Nigeria	25.63	8.198	25.772	Washington	12.49	12.074
1893	8.06	Port Harcourt	Nigeria	25.46	8.174	25.748	Washington	11.16	11.796
1892	8.07	Port Harcourt	Nigeria	25.41	8.13	25.602	Washington	11.4	11.714
1891	8.02	Port Harcourt	Nigeria	25.3	8.092	25.514	Washington	12.04	11.692
1890	7.97	Port Harcourt	Nigeria	24.73	8.056	25.306	Washington	12.47	11.912

1889	8.32	Port Harcourt	Nigeria	25.61	8.088	25.302	Washington	12.02	11.818
1888	8.09	Port Harcourt	Nigeria	25.42	8.094	25.294	Washington	11.09	11.804
1887	7.91	Port Harcourt	Nigeria	25.03	8.062	25.218	Washington	11.74	11.872
1886	7.95	Port Harcourt	Nigeria	25.78	8.048	25.314	Washington	11.2	11.704
1885	7.92	Port Harcourt	Nigeria	25.89	8.038	25.546	Washington	10.88	11.386
1884	7.77	Port Harcourt	Nigeria	25.87	7.928	25.598	Washington	12.02	11.386
1883	7.98	Port Harcourt	Nigeria	26.2	7.906	25.754	Washington	11.36	11.44
1882	8.13	Port Harcourt	Nigeria	25.81	7.95	25.91	Washington	11.88	11.468
1881	8.27	Port Harcourt	Nigeria	26.12	8.014	25.978	Washington	12.5	11.728
1880	8.12	Port Harcourt	Nigeria	25.78	8.054	25.956	Washington	12.33	12.018
1879	8.17	Port Harcourt	Nigeria	25.42	8.134	25.866	Washington	11.91	11.996
1878	8.83	Port Harcourt	Nigeria	26.08	8.304	25.842	Washington	12.53	12.23
1877	8.54	Port Harcourt	Nigeria	26.25	8.386	25.93	Washington	12.3	12.314
1876	8.08	Port Harcourt	Nigeria	25.63	8.348	25.832	Washington	11.52	12.118
1875	7.86	Port Harcourt	Nigeria	25.76	8.296	25.828	Washington	10.33	11.718
1874	8.43	Port Harcourt	Nigeria	25.97	8.348	25.938	Washington	11.79	11.694
1873	8.35	Port Harcourt	Nigeria	26.39	8.252	26	Washington	11.1	11.408
1872	8.19	Port Harcourt	Nigeria	25.96	8.182	25.942	Washington	11.24	11.196
1871	8.12	Port Harcourt	Nigeria	25.76	8.19	25.968	Washington	11.76	11.244
1870	8.2	Port Harcourt	Nigeria	25.95	8.258	26.006	Washington	12.22	11.622
1869	8.43	Port Harcourt	Nigeria	25.96	8.258	26.004	Washington	11.2	11.504
1868	8.25	Port Harcourt	Nigeria	25.75	8.238	25.876	Washington	10.44	11.372
1867	8.44	Port Harcourt	Nigeria	25.16	8.288	25.716	Washington	10.9	11.304
1866	8.29	Port Harcourt	Nigeria	26.19	8.322	25.802	Washington	11.47	11.246
	8.18				8.318		Washington	11.92	11.186
	7.98				8.228		Washington	11.51	11.248
	8.11				8.2		Washington	11.39	11.438
	7.56				8.024		Washington	11.45	11.548
	7.85				7.936		Washington	12	11.654
	7.96				7.892		Washington	11.76	11.622
	8.25				7.946		Washington	11.82	11.684

	8.1			7.944	Washington	11.83	11.772
	7.76			7.984	Washington	10.82	11.646
	8			8.014	Washington	10.57	11.36
					Washington	11.79	11.366
					Washington	12.5	11.502
					Washington	12.31	11.598
					Washington	11.5	11.734
					Washington	12.01	12.022
					Washington	11.77	12.018
					Washington	11.38	11.794
					Washington	11.88	11.708
					Washington	11.65	11.738
					Washington	12.34	11.804
					Washington	12.03	11.856
					Washington	11.83	11.946
					Washington	11.01	11.772
					Washington	12	11.842
					Washington	11.4	11.654
					Washington	11.84	11.616
					Washington	11.7	11.59
					Washington	11.4	11.668
					Washington	11.19	11.506
					Washington	10.35	11.296
					Washington	11.32	11.192
					Washington	12.06	11.264
					Washington	11.9	11.364
					Washington	11.76	11.478
					Washington	10.99	11.606
					Washington	12.81	11.904
					Washington	11.49	11.79
					Washington	13.4	12.09

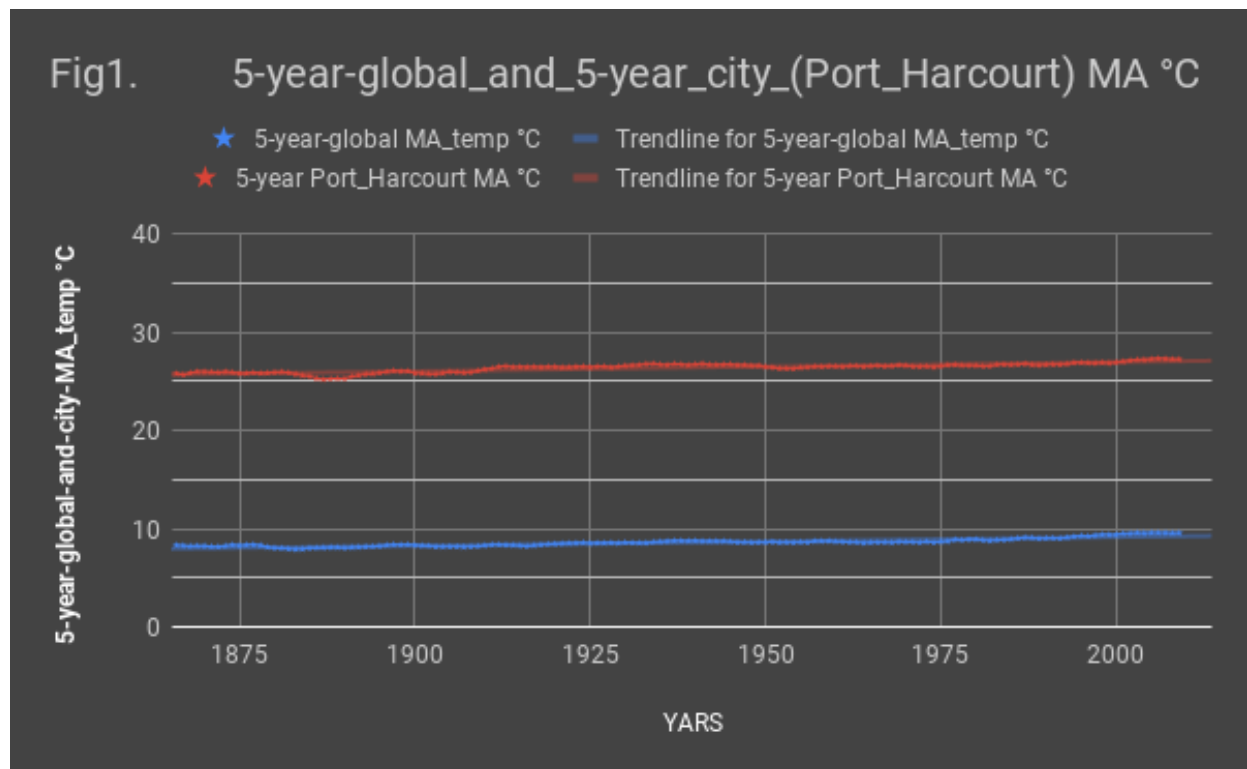
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						Washington	12.22	12.148
						Washington	10.77	11.776
						Washington	11.47	11.558
						Washington	11.38	11.456
						Washington	10.68	11.304
						Washington	10.25	10.91
						Washington	10.32	10.82
						Washington	10.7	10.666
						Washington	11.13	10.616
						Washington	11.35	10.75
						Washington	10.24	10.748
						Washington	11.65	11.014
						Washington	11.55	11.184
						Washington	11.16	11.19
						Washington	11.89	11.298
						Washington	11.62	11.574
						Washington	11.83	11.61
						Washington	12.73	11.846
						Washington	12.17	12.048
						Washington	12.47	12.164
						Washington	12.58	12.356
						Washington	12.27	12.444
						Washington	11.86	12.27
						Washington	11.81	12.198
						Washington	12.3	12.164
						Washington	11.35	11.918

						Washington	11.45	11.754
						Washington	11.69	11.72
						Washington	12.2	11.798
						Washington	12.21	11.78
						Washington	11.22	11.754
						Washington	11.83	11.83
						Washington	11.79	11.85
						Washington	11.84	11.778
						Washington	12.16	11.768
						Washington	11.45	11.814
						Washington	11.45	11.738
						Washington	10.94	11.568
						Washington	10.93	11.386
						Washington	11.24	11.202
						Washington	11.55	11.222
						Washington	12.14	11.36
						Washington	3.15	9.802
						Washington	9.16	9.448
						Washington	11.23	9.446
						Washington	11.58	9.452
						Washington	12.66	9.556
						Washington	11.89	11.304
						Washington	12.41	11.954
						Washington	12.07	12.122
						Washington	12.66	12.338
						Washington	11.39	12.084
						Washington	11.52	12.01
						Washington	10.9	11.708
						Washington	10.97	11.488
						Washington	12.45	11.446
						Washington	11.39	11.446

							Washington	11.92	11.526
							Washington	9.7	11.286
							Washington	11.92	11.476
							Washington	12.55	11.496
							Washington	10.1	11.238
							Washington	11.43	11.14
							Washington	10.48	11.296
							Washington	11.36	11.184
							Washington	12.26	11.126
							Washington	9.15	10.936
							Washington	12.22	11.094
							Washington	11.91	11.38
							Washington	5.45	10.198
							Washington	13.28	10.402
							Washington	12.51	11.074
							Washington	4	9.43
							Washington	13.88	9.824
							Washington	5.34	9.802

A line chart for the moving averages:

A line chart for the moving averages against years is presented below:



Key considerations for visualizing trends

The following key considerations were taken into account for visualizing the trends:

1. The average temperature levels of both global temperatures and Port Harcourt (city temperature).
2. The global moving average temperatures and the Port Harcourt moving average temperatures (city temperature).
3. The temperature differences of both moving averages along the y-axis (the dependent variable)
4. The temperature levels in specific years as indicated by each rectangle along the x-axis.
5. The temperature behavior in half a century measured by three consecutive rectangles.
6. The trend in the moving average temperature for each block of rectangle for each two blocks of rectangle and for half a century.

Observations

1. The global moving averages show a similar trend with Port Harcourt moving average with some slight differences.
2. The Port Harcourt moving average temperature is well above the global moving average temperatures for the years under considerations.
3. The global moving average temperature and the Port Harcourt moving average temperature both show a steady state increase with time.
4. The temperature differences of both moving averages as evident from the y-axis are relatively constant with time.
5. The years prior to 1875 recorded the lowest average temperature with temperature being relatively constant during those periods.
6. The years 1975 to 2013 experienced a steeper rise in both average global temperature and Port Harcourt city average temperature.
7. The result shows that average temperature for both the globe as well as the city closest to me, in this case Port Harcourt, is on a constant rise. Initially at a steady state level but is lately, as revealed from the year 1975 to 2000, experiencing a steeper rise with almost no noticeable drop.
8. The point 1975 to 2000 shows that the moving average temperature rise in Port Harcourt is at a slower pace relative to the moving average temperature rise of the globe for the same years. This implies that the rate at which Port Harcourt is getting hotter is slower than that by the globe.
9. It is obvious that the World is getting hotter.
10. This trend reveals that the rise in global moving average temperature and Port Harcourt moving average temperature has been consistent in the past 100 years

Comparing the global-Port-Harcourt trend with Washington:

The line chart below with respect to the state of Washington being compared with the visualization above further drives home the above observations by showing a similar trend.

