

Analysis of Temperature collected in Vientiane (Lao PDR) from 1941 up to 2012

I live in Vientiane (Capital city of Lao PDR) since 2003, and I was curious to check how the data was collected and what temperature changes they show. I have used the data from the station Vientiane: <http://climatemodels.uchicago.edu/timeseries/#Cel> and type Vientiane.

Lao PDR was a country under the French Colonial Empire and then involved in the Vietnam War and eventually belonged to the Communism sphere: “modern” technology and development penetrated very slowly.

Data collection and recording started in 1941, but the temperature data were not regularly recorded during many months of many years—data is missing because of the unstable situation. Because some data is missing, I decided to treat the data as two sets: before 1974 and after 1973.

In the data for the station Vientiane at [climatemodels.uchicago.edu](http://climatemodels.uchicago.edu), I noticed that the temperatures in the first period from 1941 (the first time data were collected until 1956) all have the digit 8 in the last (hundredth) position (i.e., a temperature of the form ##.#8); then in 1959, they have the digit 1 (##.#1); from 1961 to 1969, the digit 5 (##.#5); from 1971 to 1974, the digit 3 (##.#3); and from 1975 to 2005, the digit 2 (##.#2). Since 2005, there are no hundredths of a degree recorded, only tenths. I am suspicious of the quality and accuracy of the data set. Living in Lao PDR for the last 10 years confirm that precision and exactitude are not the priorities of local people.

**Summary:** The data set for the weather station Vientiane (Lao PDR) seems less than perfect, but if we assume that the “errors” are equally spread before and after the dividing point 1973/1974, then comparing the two data sets may yield information about climate change in Lao PDR.

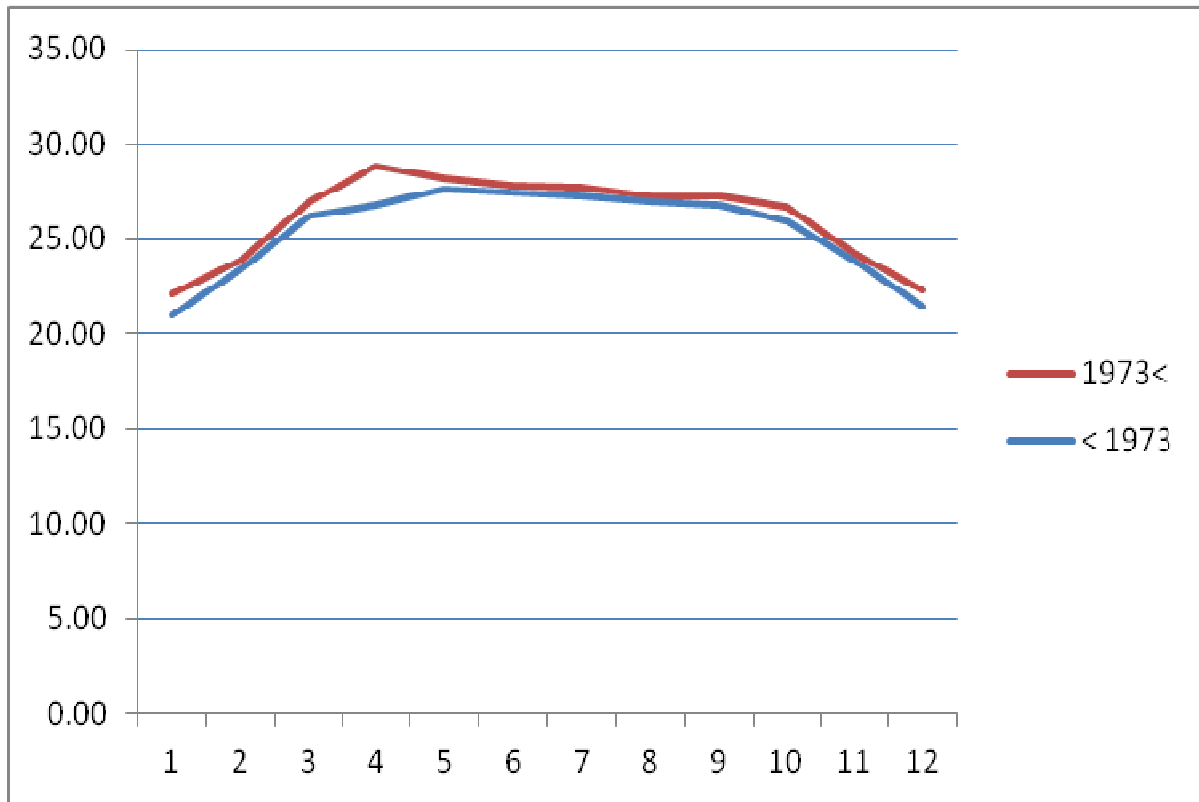
Monthly Temperature recording:

Months	< 1973	1974<	1973-1974	
1	21.04	22.13	1.09	0.39
2	23.44	23.91	0.47	-0.24
3	26.20	27.02	0.82	0.12
4	26.82	28.80	1.98	1.28
5	27.65	28.21	0.56	-0.14
6	27.45	27.80	0.35	-0.35
7	27.29	27.73	0.44	-0.26
8	26.98	27.23	0.26	-0.44
9	26.76	27.27	0.51	-0.19
10	25.99	26.67	0.68	-0.02
11	23.85	24.27	0.42	-0.28
12	21.49	22.31	0.82	0.12
Total	25.41°C	26.12°C	8.41	0.70°C

The table shows the averages for each month and also for the full year for the early data set and the late data set. For each of the months and for the year, the average for the late data set is higher than for the early data set.

The average daily temperature before 1974 was 25.41°C (around 27 years had data collected from 1941 to 1973).

The daily average temperature after 1973 was 26.11°C (around 27 years also had data collected from 1974 to 2012).



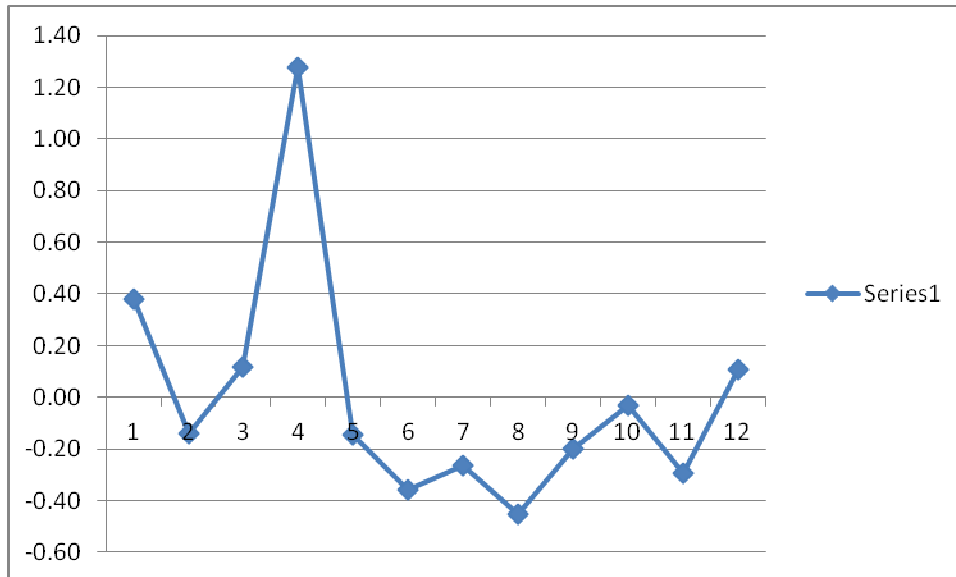
The average of the monthly differences (equal to the difference between the annual averages) for the two periods show a temperature increase of +0.70°C, which can be associated with the 31 years between the middle years of the two periods, 1957 and 1998.

This is a rate of increase of about 0.23°C per decade.

The last column in the table shows that four months had a temperature increase greater than the average annual temperature increase:

December:	+0.12°C
January:	+0.39°C

March: +0.12°C  
April: +1.28°C



Months of the year compare to the mean against the average of the year (+0.70°C) before 1973 and after

**Temperature trend, °C by decade:**

1. 1941 – 1951: - 0.66°C
2. 1951 – 1961: - 0.02°C
3. 1961 – 1971: 0.65°C
4. 1971 – 1981: 0.00°C
5. 1981 – 1991: NA
6. 1991 – 2001: 0.14°C
7. 2001 – 2011: 0.48°C
8. 1941 – 2011: 0.20°C

The data collated by decade show also an increase of the temperatures over the time with a decrease from the period 1941 -1961, and a steady increase from 1991 till 2011. The period from 1961 to 1991 may show unreliable data collection.

**Confirmation:** *"The average temperature of the Earth's surface increased by about 1.4°F (0.8°C) over the past 100 years, with about 1.0°F (0.6°C) of this warming occurring over just the past three decades."*

[\[America's Climate Choices\]](#). Washington, D.C.: The National Academies Press. 2011. p.15. [ISBN 978-0-309-14585-5](#)] *This recent 0.20°C per decade increase can be compared with the 0.23°C per decade rate of increase for the weather station Vientiane from the period 1941-1973 to the period 1974-2012.*

**Conclusion 1:** The hottest four months recorded at the weather station Vientiane belong to the so-called cooler season, before the rainy season. The cold season is much warmer than before and is more affected by climate change than the other part of the year. One identified impact is that pest infestation is no longer stopped during the cold season. A second aspect of climate change is that the beginning of the planting season can change erratically and with it the period of crops.

**Conclusion 2:** Uneven collection of temperature data can still show some real aspects of climate change. But it is better to apply international standards to help Vientiane Weather station to produce data useful to combat Climate Change.