Climate change observed at home

Masahisa Yanagisawa[1]

[1] Univ. Electro-Communications

We analyzed the maximum and minimum atmospheric temperatures observed by amateur meteorologist for 18 years at his home, and examined whether the effect of global climate change is seen in the data.

The observation has made at 3-19-34 Annaka, Annaka-shi, Gumma, Japan (138 53 49 E, 36 19 42 N) by Noboru YANAGI-SAWA and his families from January 1, 1991 to January 1, 2009. An U shape thermometer that records maximum and minimum atmospheric temperatures was set under the eaves of his house. The location is airy and there is no direct sunshine. The height of the thermometer is 1.5 m from the ground. The observations were made every day except some days and periods when he was in trip or in hospital.

The data are recorded in his diary. We keyed-in the data in the Microsoft Excel installed in a PC for analyses. Figure 1(a) shows the time variation of the maximum temperature for 18 years. Seasonal variation of 1 year period is prominent.

Then, the maximum temperature averaged over 18 years was calculated for each day in year to represent the typical seasonal variation. We subtracted the typical variation from the original data. The maximum temperatures relative to the typical values are plotted in Fig. 1(b). We best-fit a linear line to the data points by the least square method. The slope of the line shows the gradual change of the rate 0.00018 degree/day, that is, +0.066 degree/year.

It is interesting to note that the time variation of the minimum temperature relative to the typical temperatures does not show warming. The changes in vegetation or building in and around his house may cause the gradual changes. The variation of zero point of the thermometer may affect the present results. The effect of global climate change, however, is one of the candidates for the gradual warming of the maximum temperature.

Figure 1. (a) Time variation of the maximum atmospheric temperature. x-axis shows date after January 1, 1991. y-axis shows the maximum temperature. (b) The maximum temperature minus typical maximum temperature of each day in year averaged over 18 years. A line is best fitted to the all data points by the least square method. Its slope is +0.00018 degrees/day, that is, +0.066 degree/year.