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PHY/CSI/INF 451/551: Bayesian Data Analysis / Signal Processing

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Homework 3 Programming

Vostok Ice Core Sample Data Sets

The Figure 1a and 1b show the time series and the histogram of the CO₂ levels over time for the Vostok Ice Core Sample Data Sets.

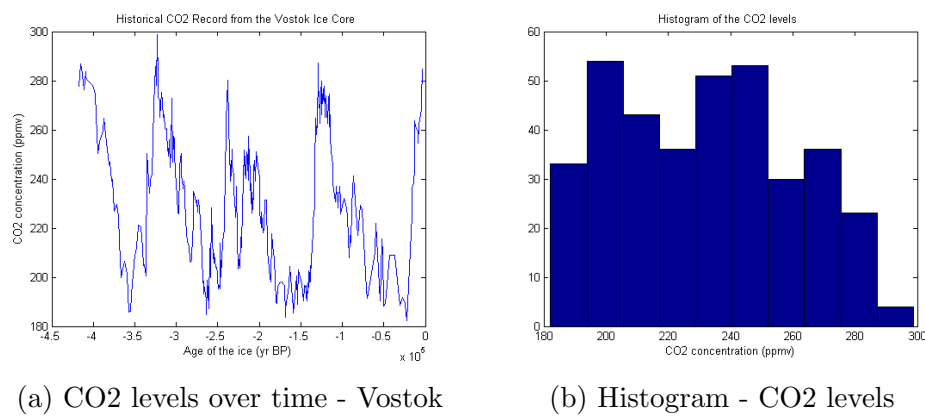


Figure 1: Vostok Graphics

The Table 1 show the values for range of variability, mean and standard deviation of the CO₂ levels

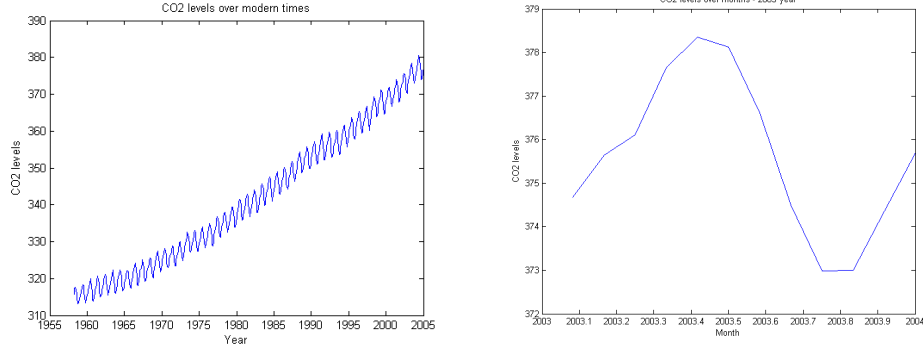
Vostok	
Range	116.5
Mean	232.186501
Standard Deviation	28.485936

Table 1: Range of variability, mean and standard deviation of the CO₂ levels - Vostok

Mauna Loa Atmospheric Sample Data Set

The Figure 2a show the time series of the CO₂ levels over modern times for the Mauna Loa Atmospheric. There is a period of the oscillations monthly, as we can see in the Figure 2b. This trend happens every year, throughout the month.

Through research conducted at <http://www.esrl.noaa.gov/>. I found possible causes of these oscillations. There is a month-to-month variability in the CO₂



(a) CO2 levels over modern times - (b) Monthly variability of 2003 year
Mauna Loa

Figure 2: Mauna Loa Graphics

concentration that may be caused by anomalies of the winds or weather systems arriving at Mauna Loa. A smooth trend consisting of a seasonal cycle. Each year, the atmospheric CO2 concentration varies between a high value in winter (because of biospheric respiration) and a low value in summer (because of drawdown by photosynthesis); thus, a wave-like pattern is superimposed on the year-to-year increasing trend.

Combine the two data sets by concatenating the arrays

The Figure 3 show the time series of the Co2 levels - old and modern dates. The Co2 level in May 1986 is equal to 350.21. After calculated the mean of the old dates, and modern dates, we found 232.186501 for the Vostok, and 342.162890 for the Mauna Loa, which shows the Vostok Co2 levels are higher than Mauna Loa Co2 levels.

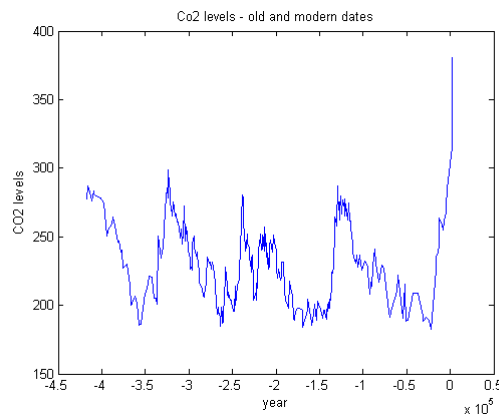


Figure 3: Co2 levels - old and modern dates