Figure 1

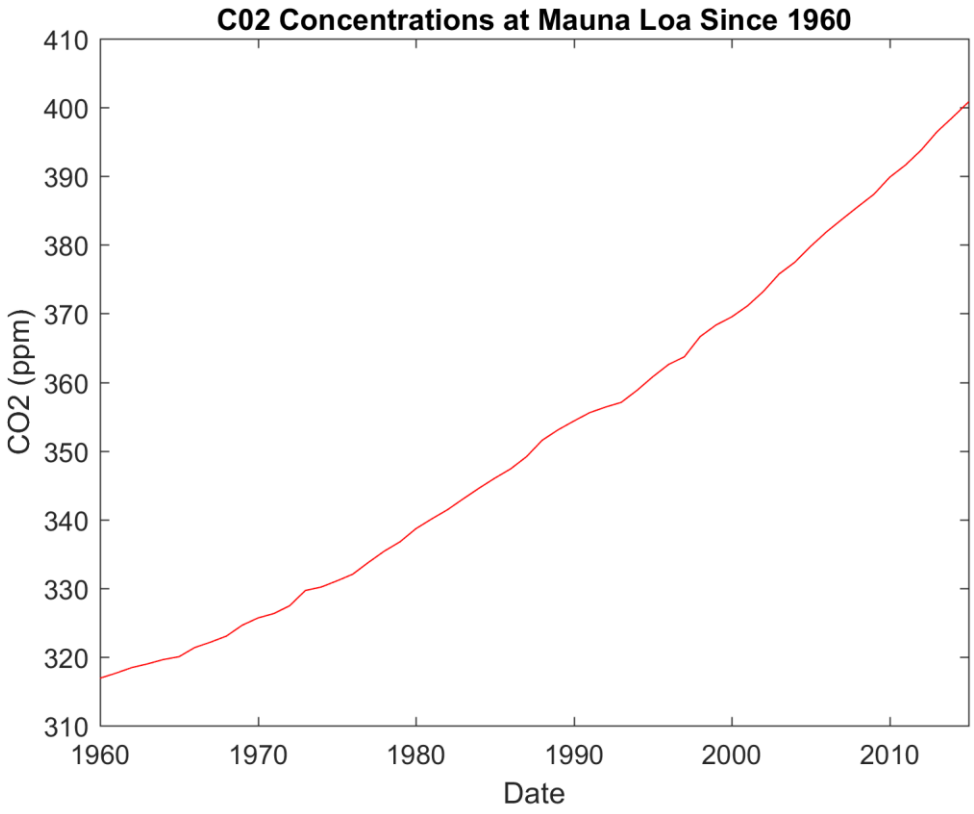

Figure 1: This Figure shows the variation in C02 concentrations at Mauna Loa Since 1960 to 2015. The Y axis is the C02 concentrations measured in parts per million (ppm), and the x axis shows the years 1960 to 2015.

```
%% Clear Matlabs Memory
clear all
close all
%% Read in Data
[data,text] = xlsread('AnnualCO2.xls');
%%Extract Useful Data
year = data(:,1); %Extract the Years
co2Annual = data(:,2); %Extract the Annual CO2 Data
%%Plot the Data
figure
plot(year,co2Annual,'color', 'r') %Plot the data against each other in red
xlabel('Date') %Make the x label 'Year'
ylabel('CO2 (ppm)') %Make the y label 'C02(ppm)'
title('C02 Concentrations at Mauna Loa Since 1960') % Make the title '
xlim([1960 2015]) %Reduce the size of the X axis
% Save the plot at medium resolution
print('-dpng','-r300','C02 Concentrations at Mauna Loa Since 1960')
```

Figure 2

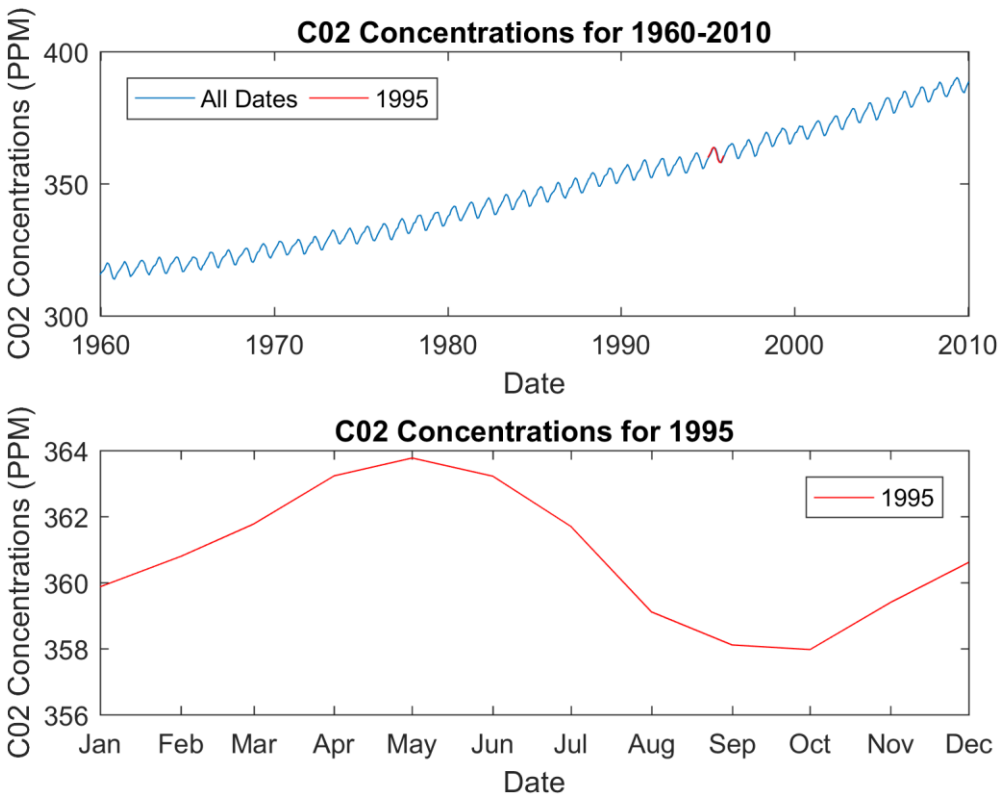

Figure 2: Figure 2 shows the seasonal variation in C02 levels at Mauna Loa. Subplot 1 (top) shows the years 1960-2010 on the x axis, and the C02 concentrations, measured in parts per million, on the y axis. The year 1995 is highlighted in both plots (red), with Subplot 2 (bottom) showing January to December along the x axis and C02 concentrations measured in parts per million on the y axis.

```
%% Clear Matlabs Memory
clear all
close all
%% Read Data to Input
[data,text] = xlsread('MaunaLoaMonthlyData.xls');
%% Extract interpolated C02 Concentrations from the whole dataset
monthlyMeanA = data(:,5); %Extract interpolated data for monthly mean
%% Extract the year 2014
nYears = length(data);  % Total rows of data
j=0;
k=1;        % j and k act as a counter for the loop
years();        % Sets up a table
for i = 1:nYears % For loop runs through each row of data
        if data(i,1)==1995 %If column i, row 1 = 1995, then j=j+k
        j=j+k;
        years(j,:)=data(i,:); %For years where j=1, extract all the data
        end
end
%% Extract interpolated C02 Concentrations for the year 1995
monthlyMeanB = years(:,5); %Extract interpolated data for monthly mean
%% Create a datenumber for the whole dataset
YearA = data(:, 1); %Extract year for each plot
MonthA = data(:, 2); %Extract month for each plot
DayA = 15;
```

```
DateA = datenum(YearA,MonthA,DayA); %calculate the datenumber for whole
dataset
%% Create a datenumber for the year 1995
YearB = years(:, 1); %Extract year for each plot
MonthB = years(:, 2); %Extract month for each plot
DayB = 1;
DateB = datenum(YearB,MonthB,DayB);%calculate the datenumber for 1995
figure
subplot(2,1,1)
plot(DateA,monthlyMeanA)
title('C02 Concentrations for 1960-2010')
xlabel('Date')
ylabel('C02 Concentrations (PPM)')
datetick('keeplimits') % Use the date for the X axis ticks and keep the
limits
xlim([715859 734153]) % Cut the axis to only show 1960-2010
hold all
plot(DateB,monthlyMeanB, 'color','r') % Plot 1995 over the data in red to
highlight it
legend ('All
Dates','1995','Location','northwest','Orientation','horizontal')
subplot(2,1,2)
plot(DateB,monthlyMeanB, 'color','r')
title('C02 Concentrations for 1995')
xlabel('Date')
ylabel('C02 Concentrations (PPM)')
datetick('keeplimits')  % Use the date for the X axis ticks and keep the
limits
xlim([728660 728994]) % Cut the axis only to show 1960-2010
legend('1995')
print('-dpng','-r300','Seasonal Variations in C02 at Mauna Loa')
```

Figure 3

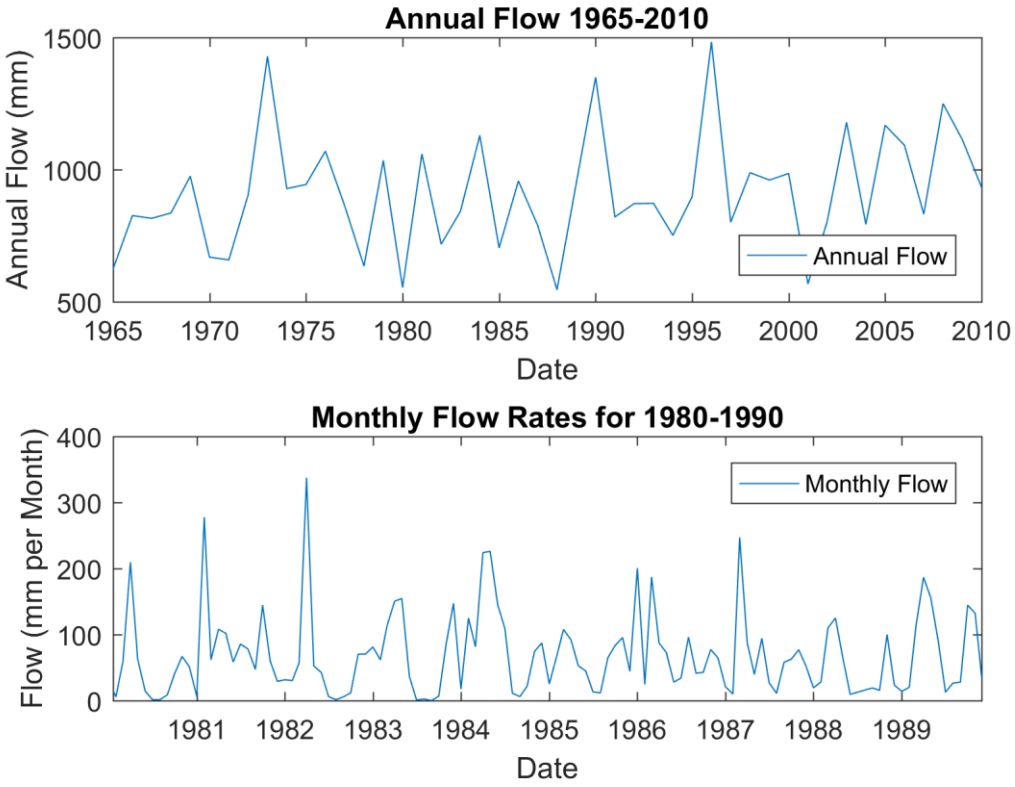

Figure 3: Figure 3 shows the changes in flow through the experiment. Subplot 1 (top) shows the annual cumulative flow for each year with the x axis showing the date and the y axis showing the Annual Flow (mm). The second subplot (bottom) shows the monthly flow rates for the years 1980 to 1990 with the x axis showing the date and the y axis showing the Flow (mm per month).

```
%% Clear Matlabs Memory
clear all
close all
%% Read in Data for Hubbard Experiment
[data,text] = xlsread('HubbardBrookExperiment.xls');
%% Extract the useful data in the dataset
Year = data(:,2); % Extract the Year Data
flow = data(:,4); % Extract Flow Data
%% Create yearly flow using a loop
Years = unique(Year); %Find the Years to sum
nYears = length(Years); %Find the Number of unique years
for i = 1:nYears
    currentYear = Years(i); %select the each year in turn
    use = Year == currentYear;  %Identify which indices correspond the
currentYear
    flowAnnual(i) = sum(flow(use));%Sum the records that are in the
currentYear
end
%% Create a datenum for the data to help with plotting
year = data(:,2);
month = data(:,3);
day = 1;
date = datenum(year,month,day);
%% Plot the data
figure
```

```
subplot(2,1,1)
plot(Years, flowAnnual)
xlim([1965 2010])
title('Annual Flow 1965-2010')
xlabel('Date')
ylabel('Annual Flow (mm)')
legend('Annual Flow','location','southeast')
%% Plot the data for 1980-1990
subplot(2,1,2)
plot(date,flow)
legend('Monthly Flow')
xlim([723200 726800])
datetick('keeplimits')
title('Monthly Flow Rates for 1980-1990')
xlabel('Date')
ylabel('Flow (mm per Month)')
print('-dpng','-r300','Changes in Flow')
```

Figure 4

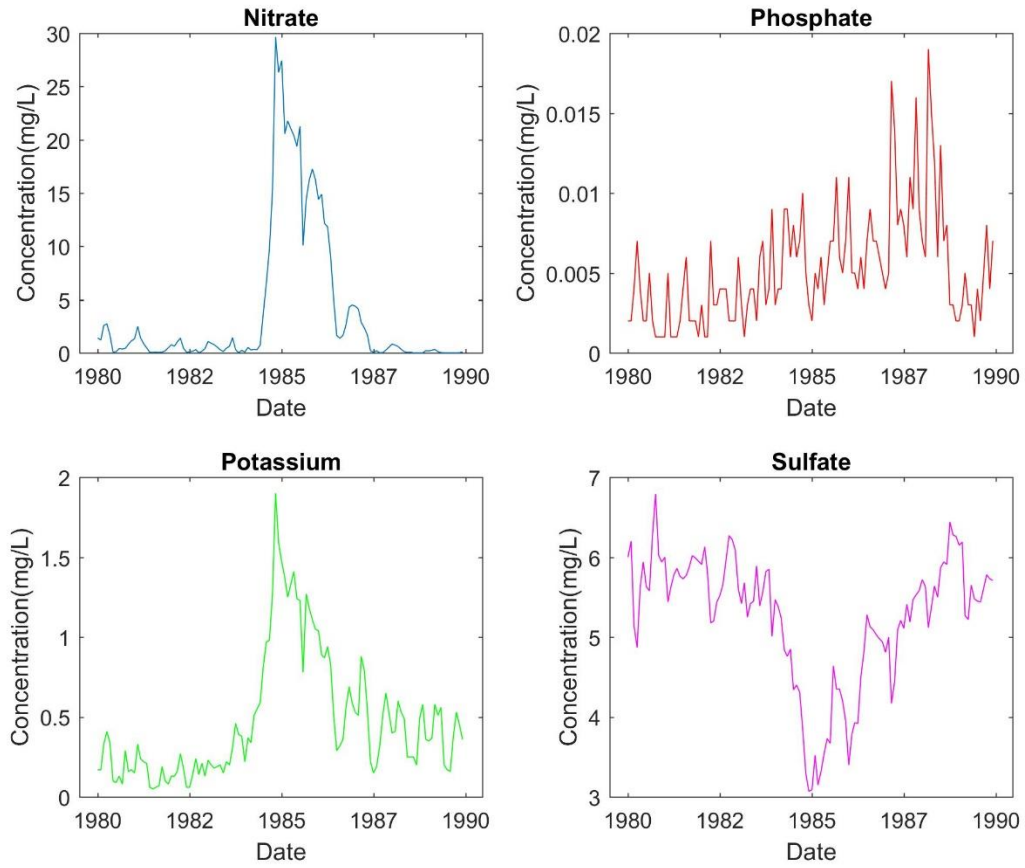

Figure 4: Figure 4 shows the chemical composition change over the period of the Hubbard experiment. All subplots have an x axis showing the date and all subplots have a y axis showing the concentration measured in milligrams per litre. The first subplot shows Nitrate concentrations over time, the second subplot shows Potassium concentrations over time, the third subplot shows Phosphate concentrations over time and the fourth subplot shows the Sulfate concentration over time.

```
%% Clear Matlabs memory
clear all
close all
%% Read in the Data
[data,text] = xlsread('HubbardBrookExperiment.xls');
%% Extract The Years 1980-1990
nYears = length(data);  % Total rows of data
j=0;
k=1;        % j and k act as a counter for the loop
years();        % Sets up a table
for i = 1:nYears % For loop runs through each row of data
    if data(i,2)>=1980&data(i,2)<1990; % If data is between 1980 1990
        j=j+k; % J becomes 1
        years(j,:)=data(i,:); %When years = j,:, extract all the data for i
    end
end
%% Extract the useful Data
nitrate = years(:,13);
phosphate = years(:,15);
```

```
potassium = years(:,7);
sulfate = years(:,12);
%% Create a Datenum to help with plotting
year = years(:,2);
month = years(:,3);
day = 1;
date = datenum(year,month,day);
%% Plot the data
figure
subplot(2,2,1)
plot(date,nitrate)
xlabel('Date')
ylabel('Concentration(mg/L)')
datetick('keeplimits')
title('Nitrate')
subplot(2,2,2)
plot(date,phosphate,'color','r')
xlabel('Date')
ylabel('Concentration(mg/L)')
datetick('keeplimits')
title('Phosphate')
subplot(2,2,3)
plot(date,potassium,'color','g')
xlabel('Date')
ylabel('Concentration(mg/L)')
datetick('keeplimits')
title('Potassium')
subplot(2,2,4)
plot(date,sulfate,'color','m')
xlabel('Date')
ylabel('Concentration(mg/L)')
datetick('keeplimits')
title('Sulfate')
print('-dpng','-r300','Chemical Changes Hubbard')
```