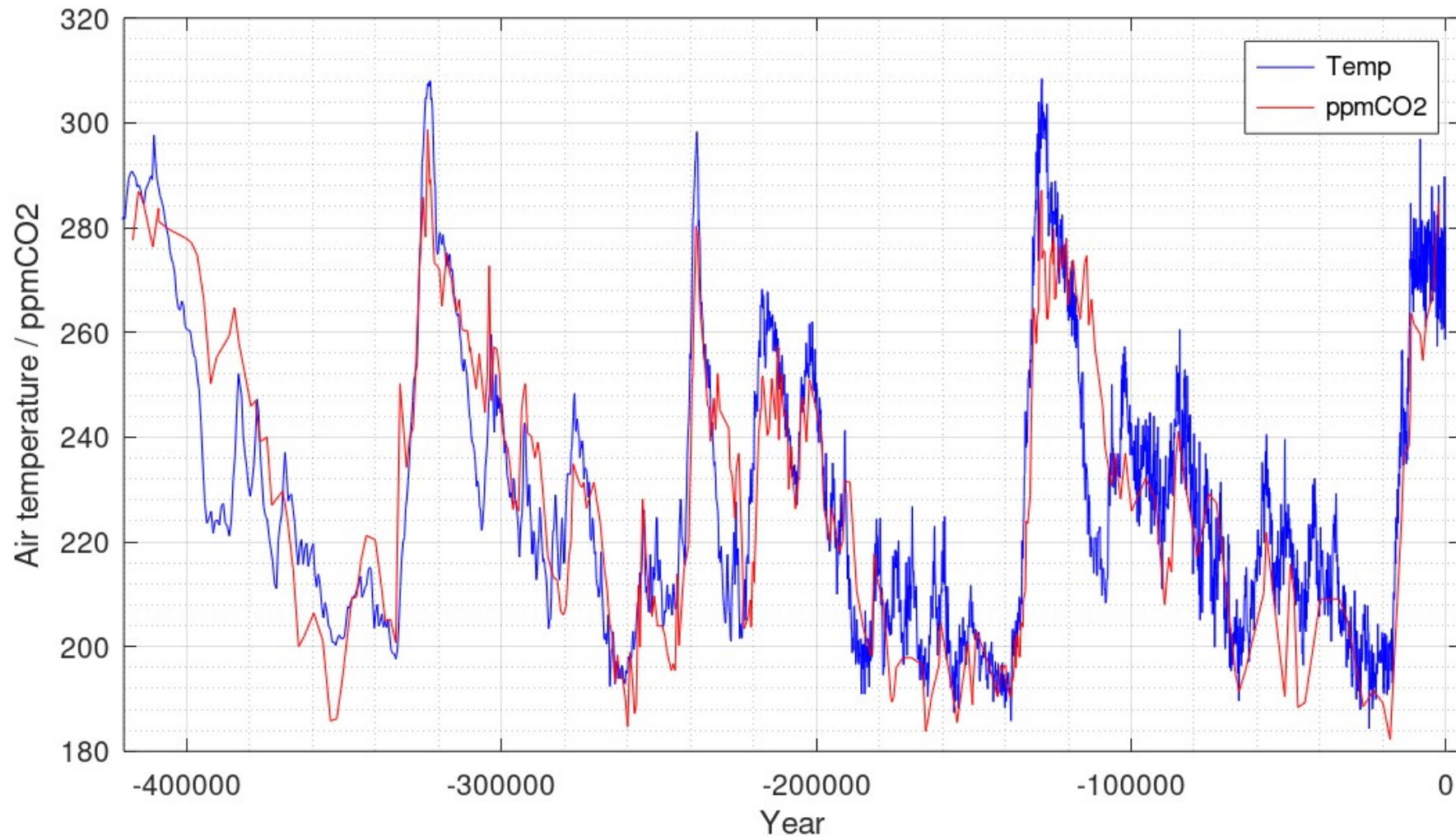
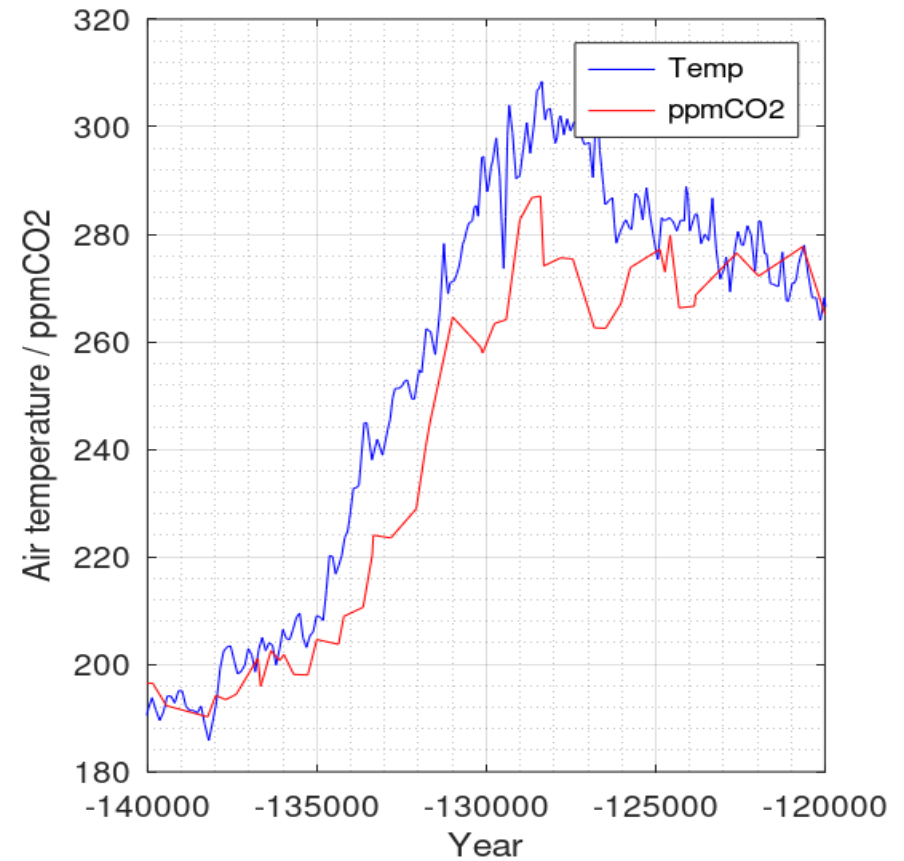
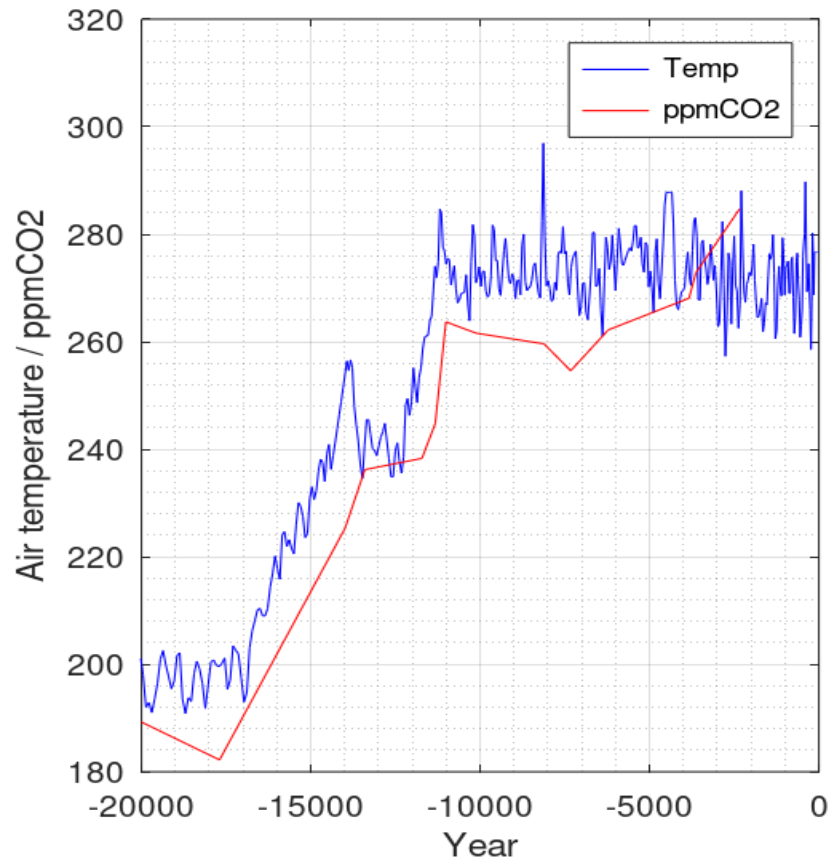


CO₂ and temperatures in the past ages (Vostok station , Antarctica)

In January 1998, the collaborative ice-drilling project between Russia, the United States, and France at the Russian Vostok station in East Antarctica yielded the deepest ice core ever recovered, reaching a depth of 3,623 m . Ice cores are unique with their entrapped air inclusions enabling direct records of past changes in atmospheric trace-gas composition. The resulting data indicate the Vostok ice-core record extends through four climate cycles, with ice slightly older than 400000 year, thus encompassing the last four ice ages ([Petit et al. 1997, 1999](#)).

Vostok air temperature /ppmCO₂





```
clear;clc;format short;format compact;
% ----- ppm CO2 -----
%f = urlwrite('https://cdiac.ess-dive.lbl.gov/ftp/trends/co2/vostok.icecore.co2','vostok_CO2.txt');
S = fileread('vostok_CO2.txt'); % vostok_temp.txt is the file 'as downloaded' from web site
a1 = 1403; % start of the useful data structure
M = S(a1:end); % M is a 'reduced' string only containing data
X = str2num(M); % the row vector is converted into a proper matrix
```

```

xYearCO2 = -X(':',3);    % years before present (air age !!)
yCO2 = X(':',4);        % ppmv CO2
mCO2 = mean(yCO2)
stdCO2 = std(yCO2)
% ----- temperature -----
S = fileread('vostok_temp.txt');    % vostok_temp.txt is the file 'as downloaded' from web site
a1 = 4571;                          % start of the useful data structure
M = S(a1:end);                      % M is a 'reduced' string only containing data
X = str2num(M);                    % the row vector is converted into a proper matrix
xYearTemp = -X(':',2);    % years before present
yTemp = X(':',4);        % temperature difference from average last 100 years Before Present (BP)
mTemp = mean(yTemp);
yTemp = yTemp + mCO2 - mTemp;
mTemp = mean(yTemp);
stdTemp = std(yTemp);
a2 = stdCO2/stdTemp;
yTemp = a2*(yTemp - mTemp) + mTemp;
plot(xYearTemp,yTemp,'b',xYearCO2,yCO2,'r');grid on;grid minor on;
axis([-420000,5000,180,320]);xlabel('Year');ylabel('Air temperature / ppmCO2');
title(' Vostok air temperature /ppmCO2');
legend('Temp','ppmCO2');
figure
subplot(1,2,1)
plot(xYearTemp,yTemp,'b',xYearCO2,yCO2,'r');grid on;grid minor on;
axis([-20000,0,180,320]);xlabel('Year');ylabel('Air temperature / ppmCO2');
legend('Temp','ppmCO2');
subplot(1,2,2)
plot(xYearTemp,yTemp,'b',xYearCO2,yCO2,'r');grid on;grid minor on;
axis([-140000,-120000,180,320]);xlabel('Year');ylabel('Air temperature / ppmCO2');
legend('Temp','ppmCO2');

```