

Strong correlation between El-Nino Index (ENSO) and global lower troposphere temperatures from satellite (UAH)

Fig.1 ENSO index vs. Global Satellite Temperatures (UAH-LT) delay=4 months

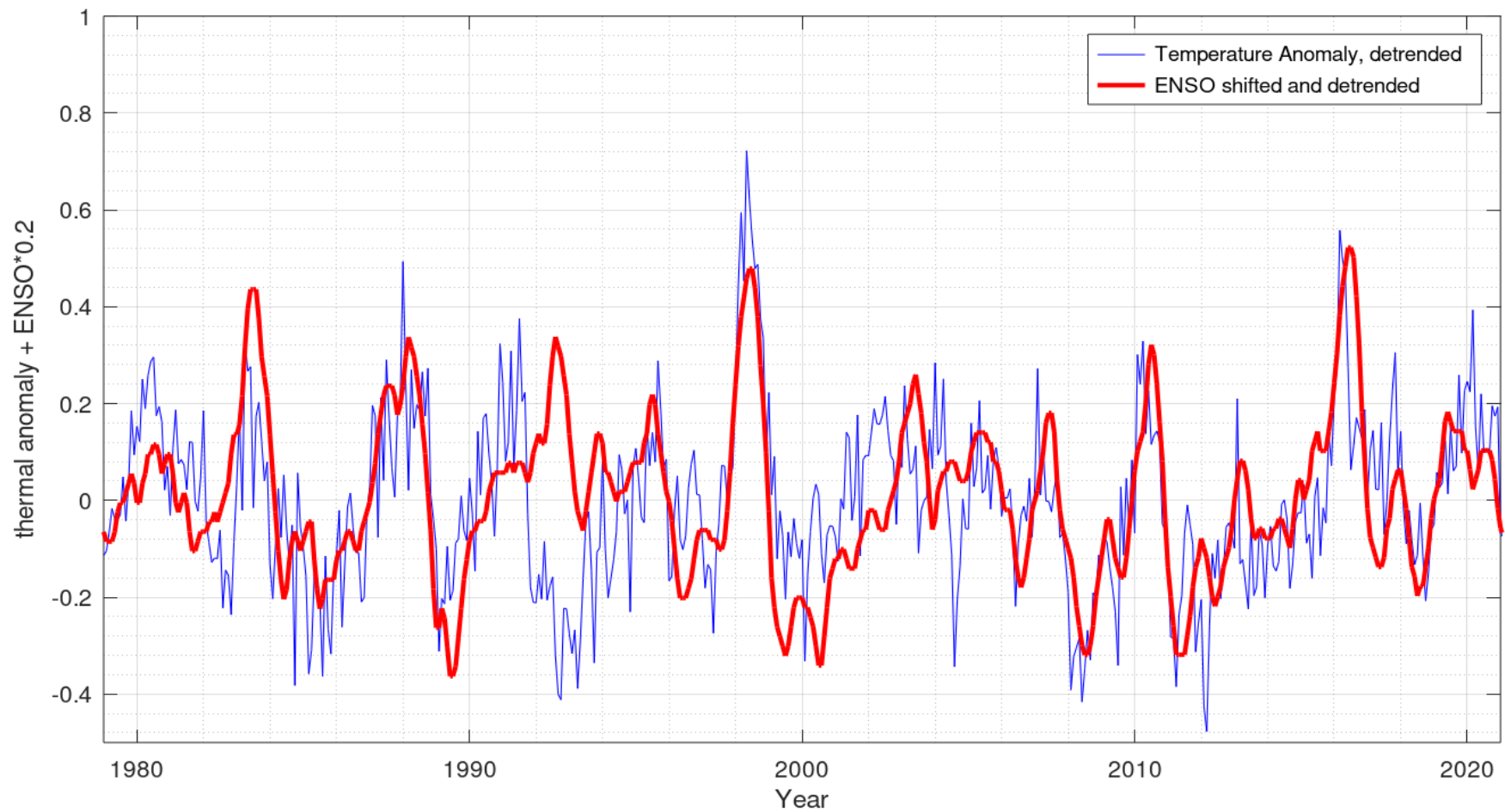
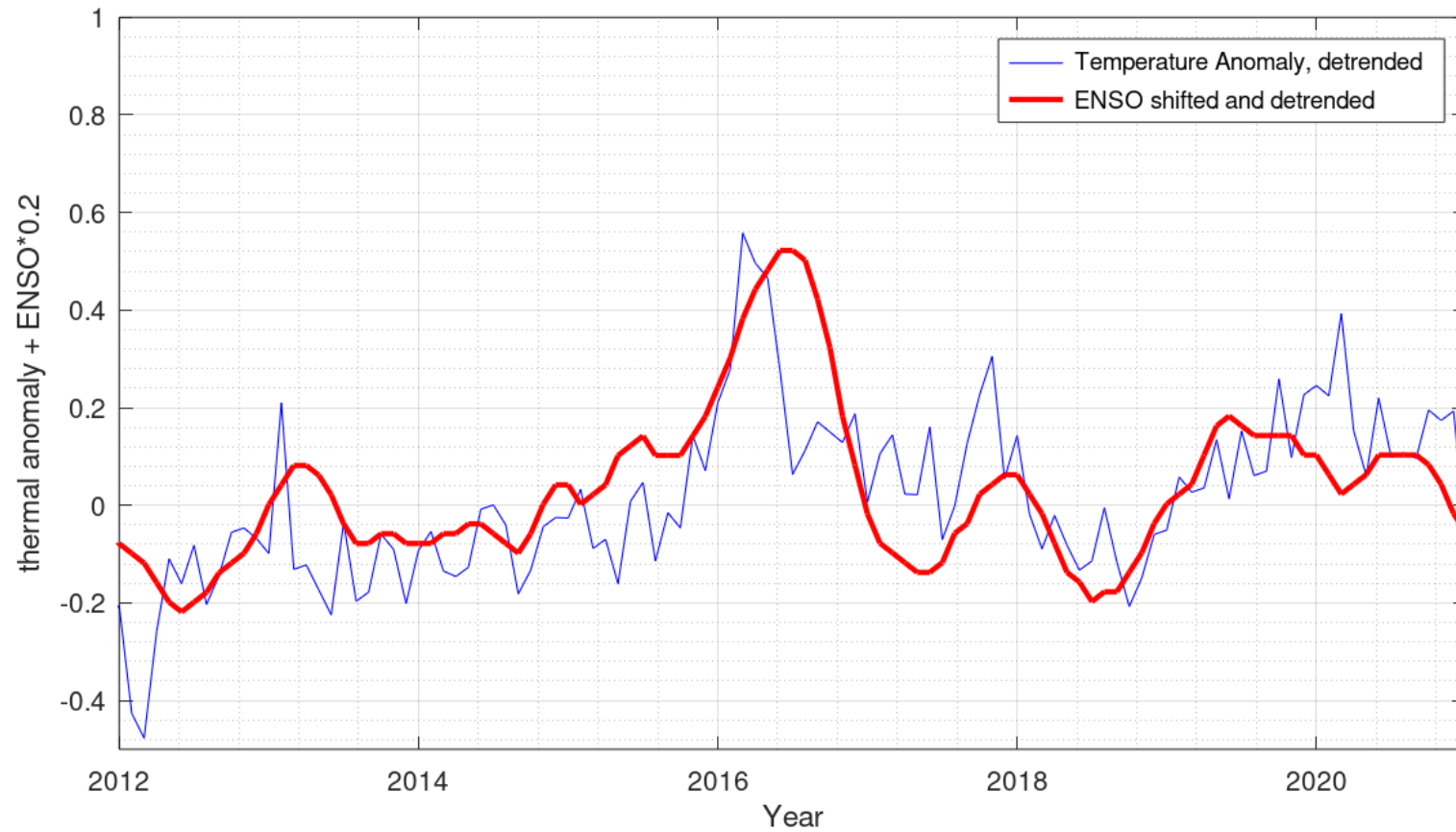


Fig.2 Enlargement of Fig.1 for 2012-2022 period delay=4 months



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clear;clc;format short;format compact;
% --- UAH
S = fileread('uah.txt'); % uah.txt is the temperature file from UAH
a1 = index(S,'1978 12');
a2 = rindex(S,'Year Mo') - 2;
M = S(a1:a2);
X = str2num(M);
xYear = X(':',1) + X(':',2)./12; % date in decimal year
yU = X(':',3); % global lower troposphere << USER select 3 to 26
nUAH = length(yU)
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% --- ENSO
S = fileread('el_nino_1.txt');
X = str2num(S);
a1 = size(X,1);k = 0;
for i = 1:a1
    for j = 2:13
        ++k;if X(i,j) == 99 ; break;endif
        xYearE(k) = X(i,1) + (j-1)/12;
        yE(k) = X(i,j);
    endfor
endfor
nENSO = length(yE);
% --- DATA ARE LINEARLY INTERPOLATED AND DETRENDED
p = polyfit(xYear,yU,1);y2 = polyval(p,xYear);
yU = yU - y2;
p = polyfit(xYearE,yE,1);y2 = polyval(p,xYearE);
yE = yE - y2;
% --- MAX CORRELATION IS SOUGHT FOR, WITH A VARIABLE DELAY
for d2 = 0:10
    yR = yE((nENSO-nUAH+1-d2):(end-d2));
    c(d2+1) = corr(yU,yR);
endfor
[i,iw] = max(c);highest_correlation = i
delay = iw-1
% --- ENSO DATA SEGMENT IS SELECTED
yR = 0.2*yE((nENSO-nUAH+1-iw):end-iw);
% --- FINAL PLOT
plot (xYear,yU,'b',xYear,yR,'r','Linewidth',2);grid on;grid minor on;axis([1979,2021,-0.5,1]);
title(['Fig.1 ENSO index vs. Global Satellite Temperatures (UAH-LT) delay=',num2str(delay),' months']);
xlabel('Year');ylabel('thermal anomaly + ENSO*0.2');
legend('Temperature Anomaly, detrended','ENSO shifted and detrended')
figure;
plot (xYear,yU,'b',xYear,yR,'r','Linewidth',2);grid on;grid minor on;axis([2012,2021,-0.5,1]);
title(['Fig.2 Enlargement of Fig.1 for 2012-2022 period delay=',num2str(delay),' months']);
xlabel('Year');ylabel('thermal anomaly + ENSO*0.2');
legend('Temperature Anomaly, detrended','ENSO shifted and detrended')

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