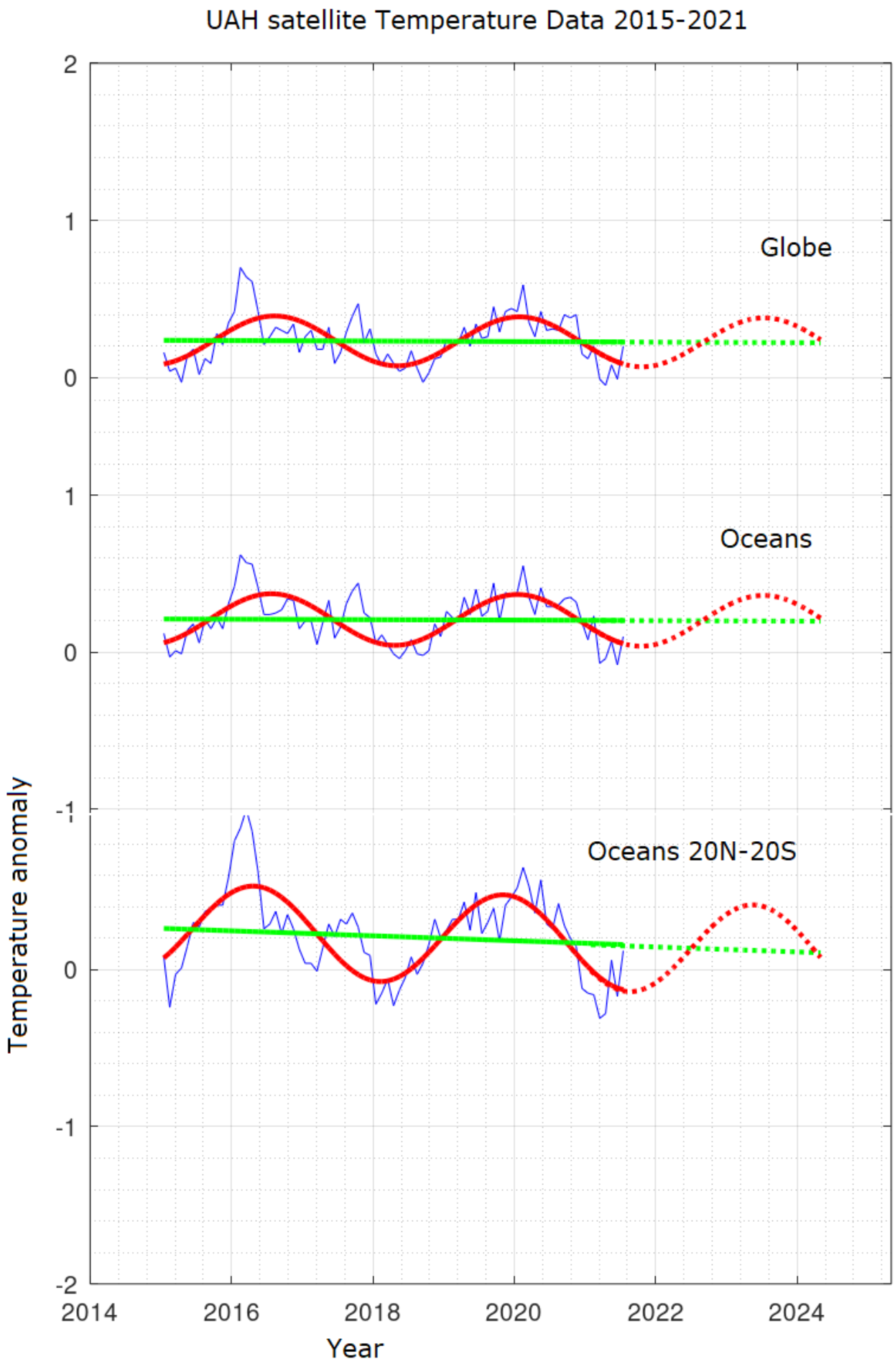
Six years of climate oscillations, 2015 to 2021



```
clear all;clc;format short;format compact;
global Ud yd xd x sumS;
function Rsquared = best(p) % ------ minimizer
  global Ud yd xd x sumS;
  Ud(:,3) = sin(2*pi/p*x);   % sin
  Ud(:,4) = cos(2*pi/p*x);   % cos
  G = inv(Ud.' * Ud);
  xd(:,1) = G*Ud.'*yd;
  ydR = yd - Ud*xd(:,1); % residuals
  Rsquared = sumsq(ydR)/sumS; % sum of residuals
endfunction              % ------ end of minimizer

%f=urlwrite('http://vortex.nsstc.uah.edu/data/msu/v6.0/tlt/
uahncdc_lt_6.0.txt','uahncdc_lt_6.0.txt');

S = fileread('uahncdc_lt_6.0.txt'); % uah.txt is the downloaded text-file.
choice = 14; % choice is 3 = globe   5 = oceans  14 = oceans 20N-20S
startYear = 2015;                                    % <<<< User
endYear = 2021;
a1 = index(S,num2str(startYear)) - 1;
a2 = rindex(S,num2str(endYear)) + 170;tit ='UAH';
M = S(a1:a2);
X = str2num(M);x = X(':',1) + (X(':',2)-0.5)./12;%  0 = Januar
yd = X(':',choice);
nTot = length(yd);sumS = sumsq(yd - mean(yd));
Ud = zeros(nTot,4);
Ud(1:nTot,1) = 1;                      % constant plateau
Ud(1:nTot,2) = linspace(-1,1,nTot);    % linear trend (orthogonal)
xd = zeros(4,1);
k = 0;
for i = logspace(-0.4,1.8,300);
  ++k;
  xL(k) = i;
  pL(k) = best(i);
endfor
plot (xL,pL,'b');grid on;grid minor on;
xlabel ('Period , years');ylabel ('R-squared');title(tit);axis([0,35]);

% plot data with first sinewave.
Min   =   fminbnd(@best,3,4);              %   1st   call   to   the   minimizer
<<<< User
x2 = best(pMin);pMin            % once found , pMin is given again to the best()
function
ySin = Ud*xd(:,1);             % ySin is the first SINEWAVE
yLin = Ud(:,1:2)*xd(1:2,1);    % yLin is the first LINEAR TREND
disp(xd);
figure;
n5 = 40 % Number of future months                <<<< User
plot (x,yd,'b',x,ySin,'r','Linewidth',2,x,yLin,'g','Linewidth',2);hold on;
grid on;grid minor on;axis([startYear-1,endYear + 1 + n5/12,-2,2]);hold on;

for j = 1:n5
  x1(j) = endYear + j/12;
  y1(j) = xd(1,1) + xd(2,1)*(2/nTot*j + 1);
  y2(j) = y1(j) + xd(3,1)*sin(2*pi/pMin*x1(j)) + xd(4,1)*cos(2*pi/pMin*x1(j));
endfor
plot
(x1,y1,'g','Linewidth',2,'Linestyle',":",x1,y2,'r','Linewidth',2,'Linestyle',":")
;
```