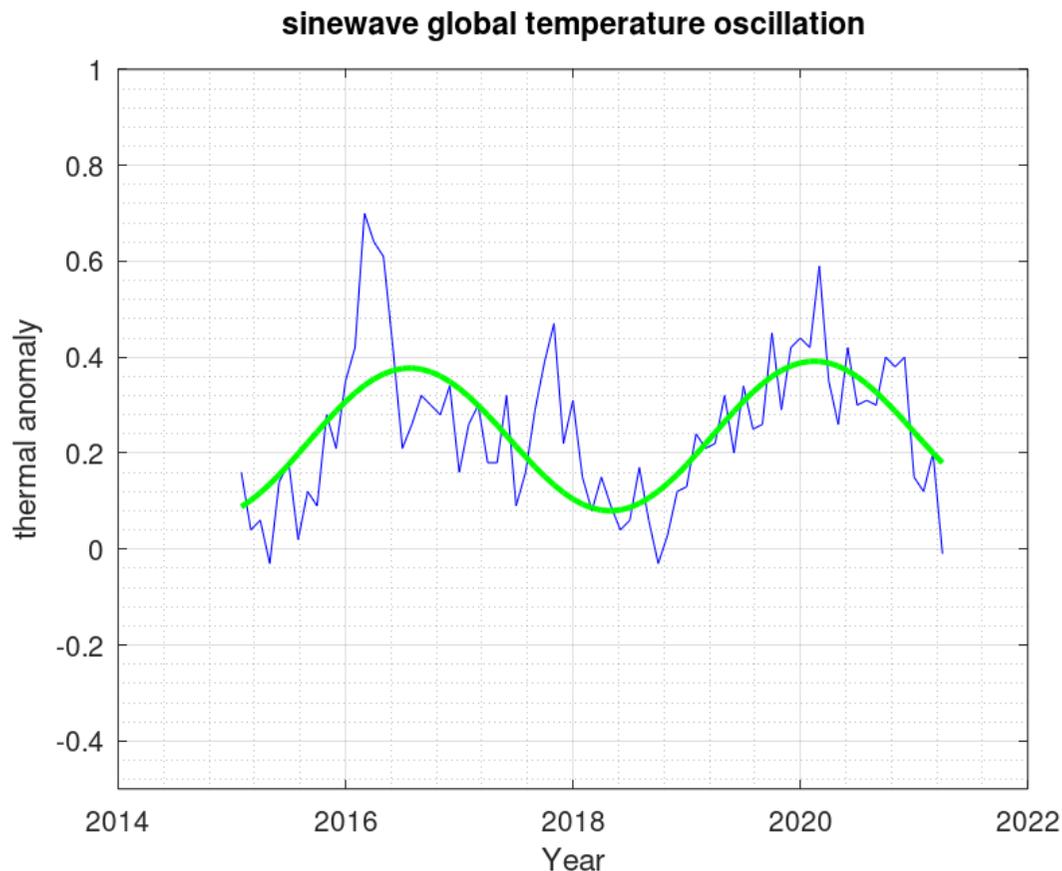


Six years of climate oscillations

A least square refinement of the UAH records pertaining to the last climate pause (or hyatus or stillstand, 2015-2021) reveal an oscillatory trend. The figure and the script are listed here below.



Global monthly average temperatures are reported on one of the most visited climate-site, the [University of Alabama](#) at Huntsville (UAH), USA. Other authoritative web-based sources for global temperature records are RSS(Remote Sensing System) and HadCRUT.

The following graphs all use the data obtained by the National Oceanographic and Atmospheric Administration (NOAA) TIROS-N satellite, interpreted by Dr. Roy Spencer and Dr. John Christy, both at Global Hydrology and Climate Center of the same University.

Records start from december,1978 and are regularly updated. They refer to four layers of the planet's atmosphere:

1. lower troposphere
2. middle troposphere

3. tropopause
4. lower stratosphere

For each of the four regions of the atmosphere 24 regions of the globe are examined, namely :

| | | | |
|-------------------|------------------|-------------------|-----------------------------------|
| 3 = <i>Globe</i> | 4 = <i>Land</i> | 5 = <i>Ocean</i> | <i>whole globe 90S-90N</i> |
| 6 = <i>Globe</i> | 7 = <i>Land</i> | 8 = <i>Ocean</i> | <i>northern hemisphere 0-90N</i> |
| 9 = <i>Globe</i> | 10 = <i>Land</i> | 11 = <i>Ocean</i> | <i>southern hemisphere 90S-0</i> |
| 12 = <i>Globe</i> | 13 = <i>Land</i> | 14 = <i>Ocean</i> | <i>tropics 20S-20N</i> |
| 15 = <i>Globe</i> | 16 = <i>Land</i> | 17 = <i>Ocean</i> | <i>northern extention 20N-90N</i> |
| 18 = <i>Globe</i> | 19 = <i>Land</i> | 20 = <i>Ocean</i> | <i>southern extention 20N-90N</i> |
| 21 = <i>Globe</i> | 22 = <i>Land</i> | 23 = <i>Ocean</i> | <i>north pole 60N-90N</i> |
| 24 = <i>Globe</i> | 25 = <i>Land</i> | 26 = <i>Ocean</i> | <i>south pole 90S-60N</i> |

(numbers refer to the columns in the matrix)

The combination of the 4 layers with the 24 regions gives a total of $24 \times 4 = 96$ possible graphs.

The script executes a least square refinement of a sinusoidal wave to the thermal anomalies (UAH, global lower troposphere). To this wave a constant value and a linear increment are superimposed.

```
clear;clc;format short;format compact;
global Ud yd xd n;
% differently from Matlab, Octave functions are defined at the very beginning of the program !
function ydRes = best(p)
    global Ud yd xd n;
    Ud(:,3) = sin(2*pi/p*n);    % sin
    Ud(:,4) = cos(2*pi/p*n);    % cos
    G = inv(Ud.' * Ud);
    xd(:,1) = G*Ud.'*yd;
    ydR = yd - Ud*xd(:,1);    % residuals
    ydRes = sum(abs(ydR));    % sum of residuals
endfunction

S = fileread('uah.txt'); % uah.txt is the downloaded file
a1 = index(S,'2015 1');    % <<<user
a2 = rindex(S,'Year Mo') - 2;
M = S(a1:a2);
X = str2num(M);
xYear = X(':',1) + X(':',2)./12; % date in decimal year
yd = X(':',3);    % global lower troposphere data <<<user
nTot = length(yd)
```

```

disp ([X(1,1),X(1,2)]);      % start year, month
disp ([X(nTot,1),X(nTot,2)]); % end year, month
Ud = zeros(nTot,4);
Ud(1:nTot,1) = 1;           % constant plateau
Ud(1:nTot,2) = linspace(-1,1,nTot); % linear trend (orthogonal)
n = linspace(1,nTot,nTot);
xd = zeros(4,1);

pMin = fminbnd(@best,30,50) % call to the minimizer
x2 = best(pMin);           % once found , pMin is given again to the best() function

correlation = corr(yd,Ud*xd(:,1))

plot (xYear,yd,'b',xYear,Ud*xd(:,1),'g','LineWidth',2);grid on;
grid minor on;axis([2014,2022,-0.5,1]);
title('sinewave global temperature oscillation');
xlabel('Year');ylabel('thermal anomaly')

```

Output in command window

```

nTot = 75           (number of examined months)
    2015           1           (start)
    2021           3           (end)
pMin = 42.096      (period in months , 3.508 years)
correlation = 0.6682 (correlation between data and sinewave)

```