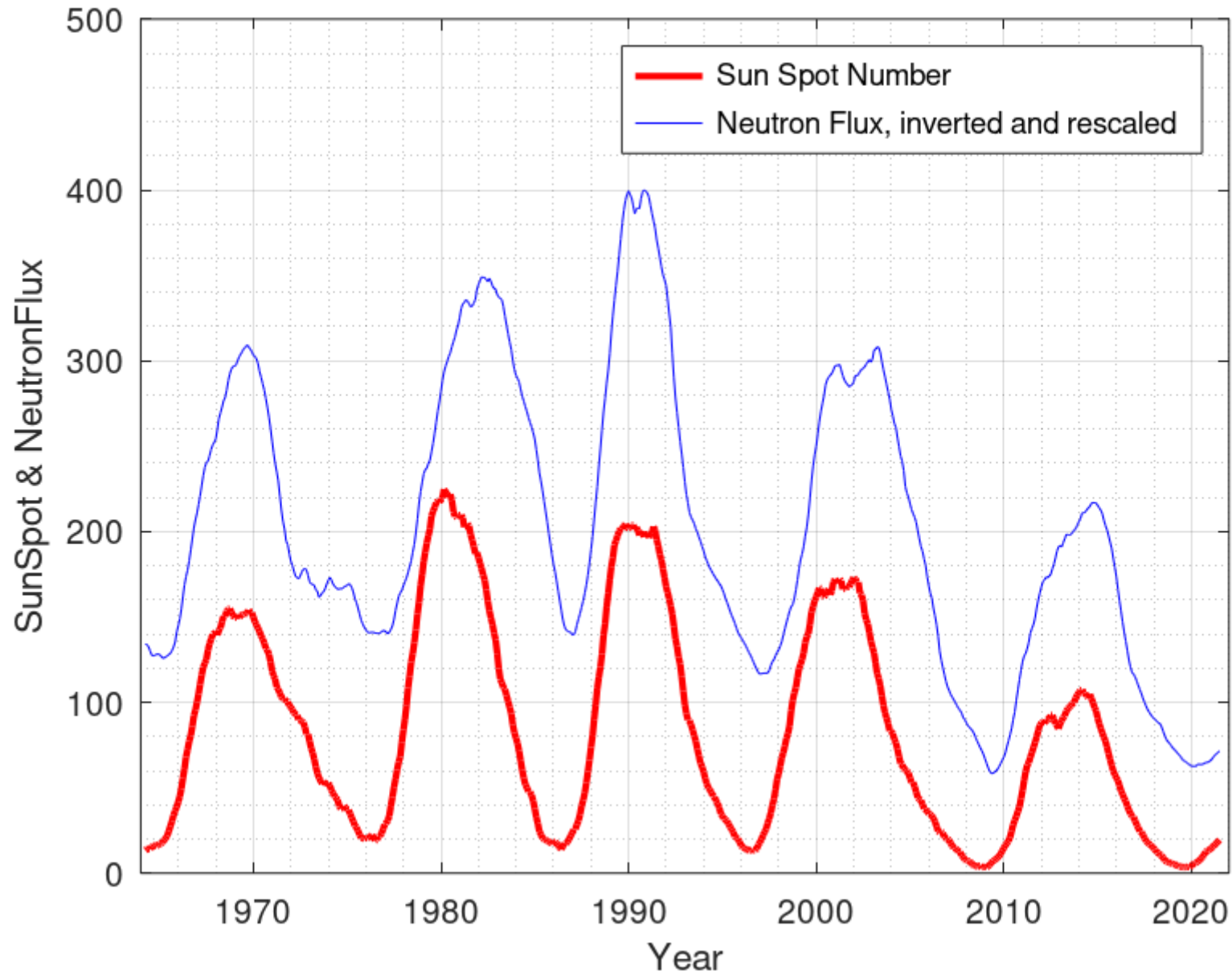


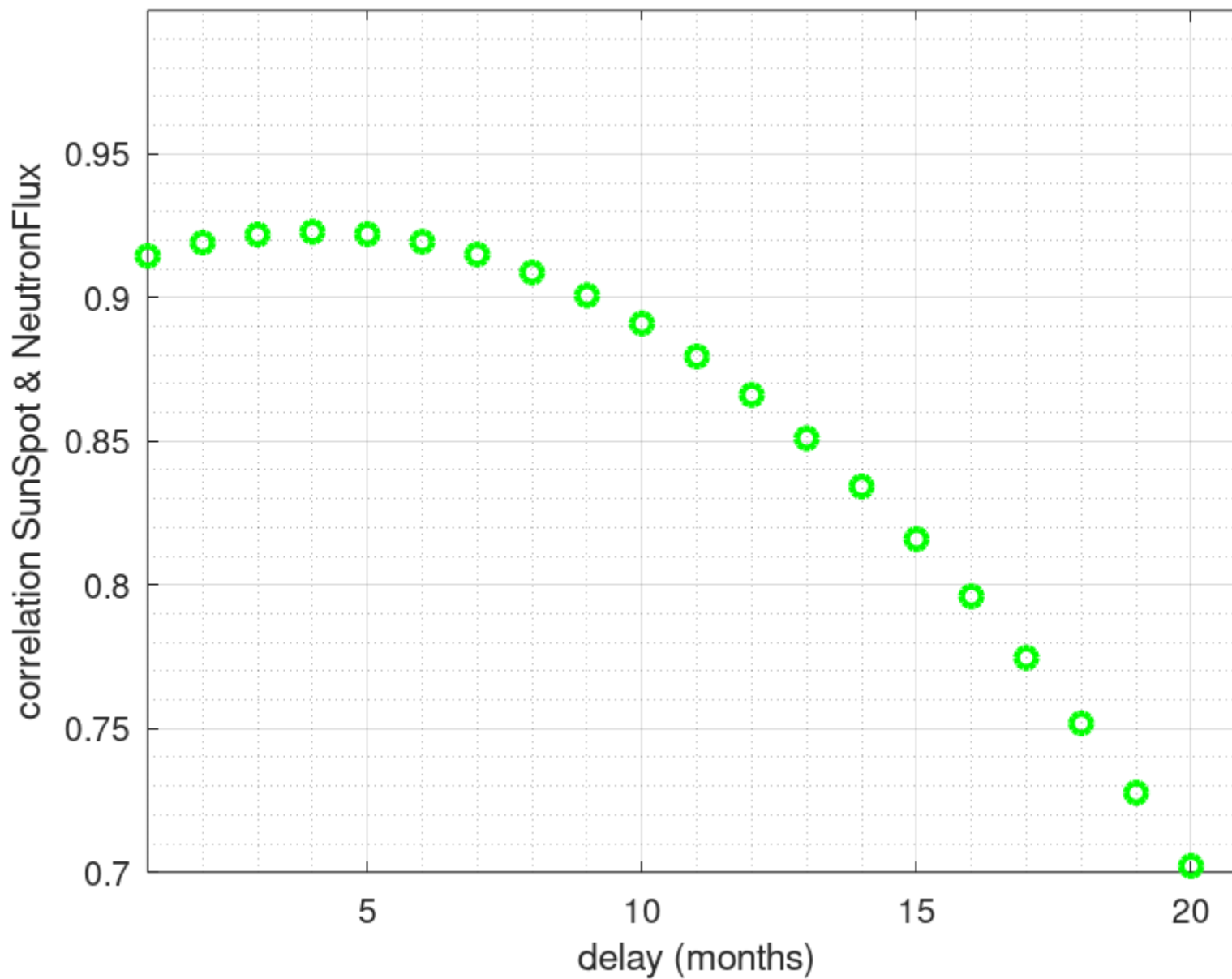
Strong correlation between Sun Spot Number (Silso) and neutron Flux (OULU). Sunspots number anticipates by about 5 months the neutron flux

SunSpot / NeutronFlux compared from april 1964



delay (months) = 5 correlation(max) = 0.92291

SunSpot / NeutronFlux correlation - with variable delay



```

clear all;clc;format short;format compact;
% SILSO Sunspot Index and Longterm Solar Observations / Royal Observatory of belgium, Brussels
% http://sidc.oma.be/silso/DATA/SN_m_tot_V2.0.txt
% f = urlwrite('http://sidc.oma.be/silso/DATA/SN_m_tot_V2.0.txt','silso.txt')
S = fileread('silso.txt');
a1 = index(S,'1964 04');
M = S(a1:end);
M = strrep(M,' *','');
X = str2num(M);
xYear = X(':',3) - 1/24;yS = X(:,4);% january = 0.5/12
yS = movmean(yS,20); %<<< User may vary '20'

% Neutron Monitor database query - [OULU, DOMC, DOMB NM detectors]- http://cosmicrays oulu.fi/
% Station: OULU NEUTRON MONITOR
S = fileread('OULU_monthly.txt');
a1 = index(S,'1964.04.01');
a2 = rindex(S,'CORR') - 1;
M = S(a1:a2);
M = strrep(M,',' ,');
M = strrep(M,':' ,');
X = str2num(M);
yN = (7000 - X(:,10))/4; % Linerly modified monthly neutron Flux
% yN = modified neutron Flux = (7000 - NeutronFlux)/4
yN = movmean(yN,20); %<<< User may vary '20'
plot(xYear,yS,'r','LineWidth',2,xYear,yN,'b');grid on;grid minor on;axis([1964,2022,0,500]);
xlabel('Year');ylabel('SunSpot & NeutronFlux');
title('SunSpot / NeutronFlux compared from april 1964')
legend('Sun Spot Number','Neutron Flux, inverted and rescaled');

% delayed correlation
j = 0;
for i = -10:10
    ++j;
    if i >= 0
        c(j) = corr(yN(1:(end-i)),yS((1+i):end));
    else
        c(j) = corr(yN((1-i):end),yS(1:(end+i)));
    endif
    disp([j,c(j)])
endfor
[w,iw] = max(c);disp(['delay (months) = ',num2str(9-iw),' correlation(max) = ',num2str(w)]);
figure;
plot(c,'og','LineWidth',2);grid on;grid minor on;axis([1,21,0.7,1]);

```

```
xlabel('delay (months)');ylabel('correlation SunSpot & NeutronFlux');  
title('SunSpot / NeutronFlux correlation - with variable delay')
```