

## Homework 7

```

close all;
clear all;

% load potential the data
load -ASCII hot_pp.txt;

% extract the data and remove missing data
hot_pp(hot_pp==-9)=NaN;
c=hot_pp(:,1);
t=hot_pp(:,2);
p=hot_pp(:,3);
chl=hot_pp(:,4);
ppl=hot_pp(:,5);
ppd=hot_pp(:,6);
npp=ppl+ppd;

% extracting the data at standard depths
pstd=[5 25 45 75 100 125 150 175];
for i=1:length(pstd)
    chlc(i)=nanmean(chl(p==pstd(i)));
    pplc(i)=nanmean(ppl(p==pstd(i)));
    ppdc(i)=nanmean(ppd(p==pstd(i)));
    nppc(i)=nanmean(npp(p==pstd(i)));
end

% (1) Plotting Chl-a
figure(1);
plot(chl,p,'.','color',[.7 .7 .7]);
hold on;
plot(chlc,pstd,'k-','linewidth',2);
hold off;
axis([0 .3 0 180]);
set(gca,'Ydir','reverse');
set(gca,'linewidth',2);
xlabel('chl-a at HOT (mg/m3)','fontsize',16);
ylabel('depth (m)','fontsize',16);
legend({'raw data' 'mean'});

% (2) Finding deep chl max
[dummy,Kmax]=max(chlc);
disp('.....')
disp(['(2) the deep chl maximum is at ',num2str(pstd(Kmax)),' dbar '])

% (3) plotting NPP
figure(2);
plot(npp,p,'.','color',[.7 .7 1]);
hold on;
plot(nppc,pstd,'b-','linewidth',2);
hold off;

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axis([0 12 0 180]);
set(gca,'Ydir','reverse');
set(gca,'linewidth',2);
xlabel('NPP at HOT (mgC/m3/day)','fontsize',16);
ylabel('depth (m)','fontsize',16);
legend({'raw data' 'mean'});

% (4)
disp('.....')
disp(['(4) NPP peaks at the surface, but Chl-a is at its maximum in the subsurface layer at ab
out 100m depth. ']);

% (5) vertical integration
pstdc=[0 .5*(pstd(1:end-1)+pstd(2:end)) 200];
dp=diff(pstdc);
Inpp=sum(nppc.*dp)*1e-3; %% in gC/m2/day
disp('.....')
disp(['(5) Vertically integrated NPP is ',num2str(Inpp,3),'gC/m2/day']);

% (6) Globa mean NPP
gNPP = 50 * 1e15; % gC/yr
Area = 0.7 * 4*pi * (6.37e6)^2; % surface area
AveNPP = gNPP/Area/365; % gC/m2/day
disp('.....')
disp(['(6) Global mean NPP is ',num2str(AveNPP,3),'gC/m2/day']);
disp(['NPP at HOT is similar to, but is slightly greater than, the global mean value.']);

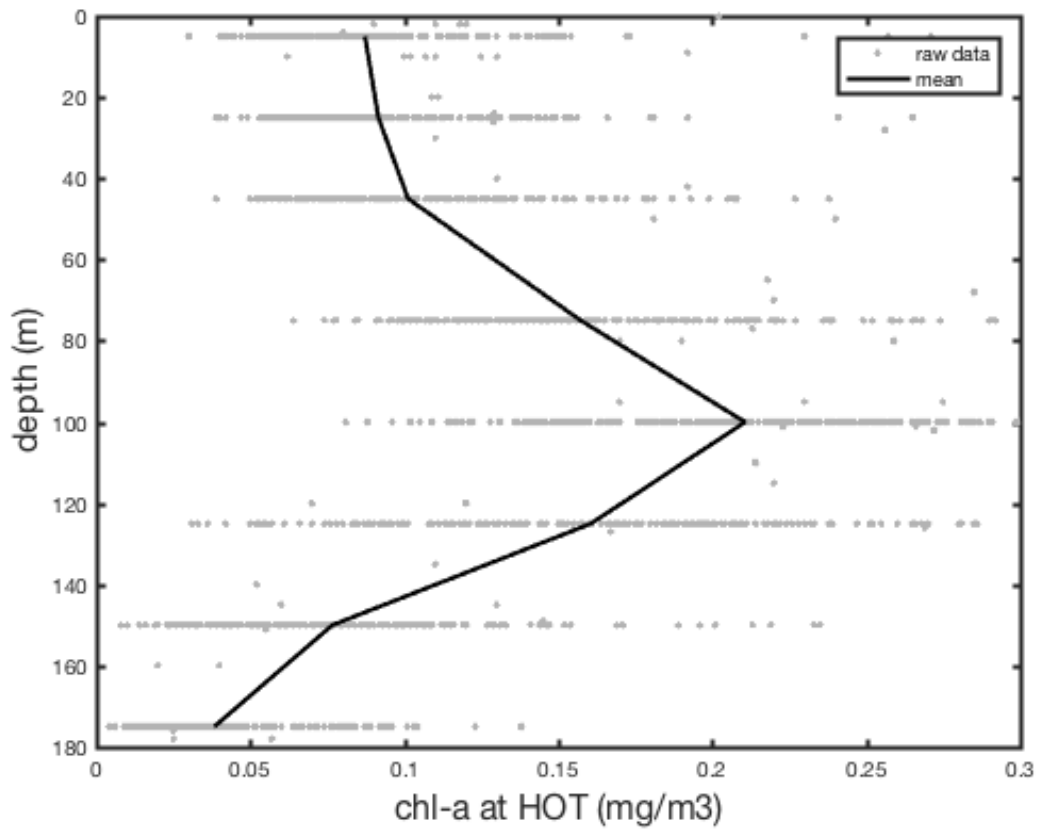
% (7) MRT
MRT = 1000/15; % in years
disp('.....')
disp(['(7) MRT is defined by (inventory)/(flux) and it estimates the timescale an element in t
he reservoir is cycled.']);
disp(['MRT of surface ocean carbon is ',num2str(MRT,3),' years. ']);

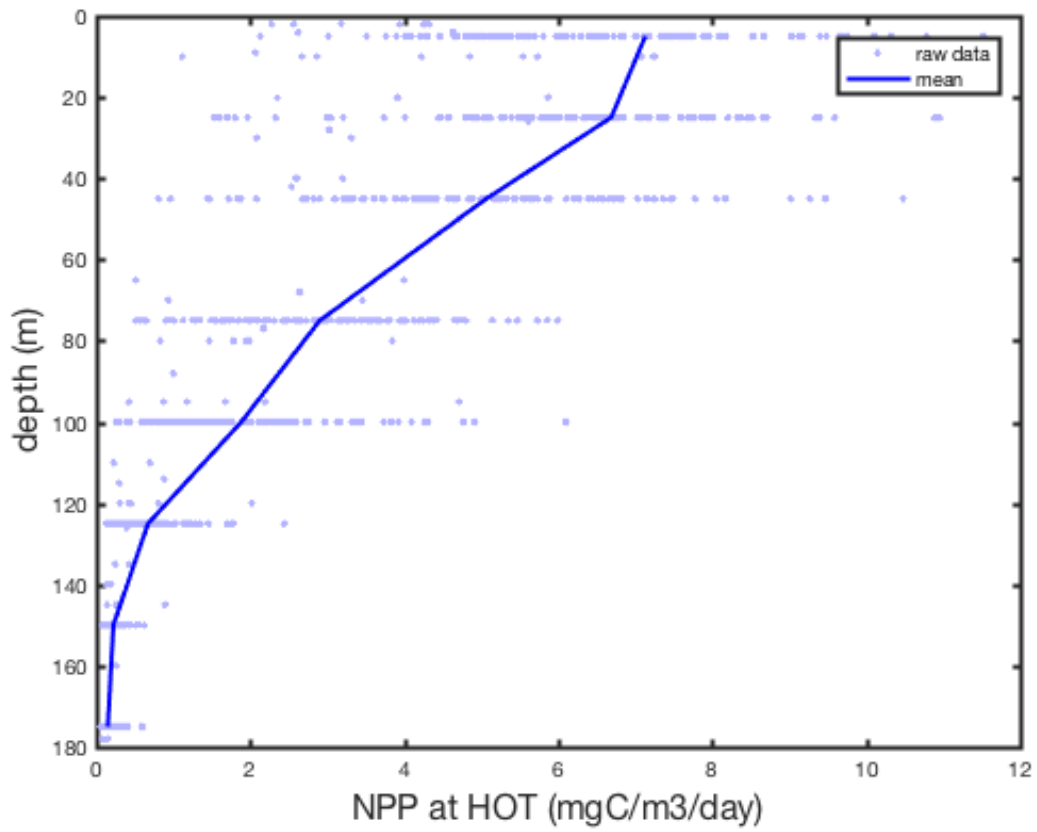
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.....
(2) the deep chl maximum is at 100 dbar
.....
(4) NPP peaks at the surface, but Chl-a is at its maximum in the subsurface layer at about 100
m depth.
.....
(5) Vertically integrated NPP is 0.522gC/m2/day
.....
(6) Global mean NPP is 0.384gC/m2/day
NPP at HOT is similar to, but is slightly greater than, the global mean value.
.....
(7) MRT is defined by (inventory)/(flux) and it estimates the timescale an element in the rese
rvoir is cycled.
MRT of surface ocean carbon is 66.7 years.

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