```matlab
clear all
close ('all')
clc
```

plot formation tops

```matlab
BHplottops_6506_12_1;
%
topblk = blanks(1);
blkvec = [topblk; topblk; topblk; topblk; topblk; topblk; topblk; topblk;...
          topblk; topblk; topblk; topblk; topblk; topblk; topblk;...
          topblk; topblk; topblk; topblk; topblk; topblk; topblk;];
% open file
%
fid = fopen('C:\Users\naphtalo.WIN-NTNU-NO.000\Documents\MATLAB\6506_12_1_2_napthali\6506
_12_1_composite.las');
%
% Read header from file
%
for i=1:50,
  fgetl(fid);
end
%
% Read data from file
%
logfile = fscanf(fid,'%f',[10,inf])';
%
% close file
%
fclose(fid);
%
% assign values to variables
%
md_depth_6506_12_1 = logfile(:,1);
cali_6506_12_1 = logfile(:,10);
vp_6506_12_1 = 304800./logfile(:,5);
gr_6506_12_1 = logfile(:,6);
nphi_6506_12_1 = logfile(:,3);
rhob_6506_12_1 = logfile(:,4);
rdep_6506_12_1 = logfile(:,7);
%
vp_6506_12_1(vp_6506_12_1 < 1500) = nan;
vp_6506_12_1(vp_6506_12_1 > 6050) = nan;
rhob_6506_12_1(rhob_6506_12_1 < 1.0) = nan;
rhob_6506_12_1(rhob_6506_12_1 > 2.8) = nan;
gr_6506_12_1(gr_6506_12_1 < 0) = nan;
rdep_6506_12_1(rdep_6506_12_1 < 0) = nan;
```

```matlab
rkb_6506_12_1 = 22;
zwater_6506_12_1 = 250;
```

```matlab
tvdmsl_6506_12_1 = md_depth_6506_12_1 - rkb_6506_12_1;
tvdbsf_6506_12_1 = md_depth_6506_12_1 - (zwater_6506_12_1 + rkb_6506_12_1);
```

Extraploate logs to sea surface

```matlab
 vp_water = 1500; % m/s
 rhow = 1.03; % g/cc
 gr_water = 0; % gAPI
 rt_water = 0.2; % ohm m
%
 vpo = 1550; % m/s
 phi0 = 0.36; % Porosity within the seabed in fractions
 rhoma = 2.65;
 rhob_seabed = (1 - phi0)*rhoma + phi0*rhow; % g/cc
 gr_seabed = 70; % Gamma reading in the seabed
 rt_seabed = 1.0; % resistivity in seabed
%
% Exponential decay parameter
%
 gammabefore = 5.0;
 gammaafter = 2.0;
%
 merge_log = 325; % TVD MSL
 [vp_exp_mod,z_log_merge_vp] = log_2_sea_level_new_2(zwater_6506_12_1,vp_water,vpo,vp_6506
_12_1,tvdmsl_6506_12_1,merge_log,gammabefore,gammaafter); % Vp in m/s
 merge_log = 326; % TVD MSL
 [rhob_exp_mod,z_log_merge_rhob] = log_2_sea_level_new_2(zwater_6506_12_1,rhow,rhob_seabed
,rhob_6506_12_1,tvdmsl_6506_12_1,merge_log,gammabefore,gammaafter); % RhoB in g/cc
 [nphi_exp_mod,z_log_merge_nphi] = log_2_sea_level_new_2(zwater_6506_12_1,60,0.40,nphi_650
6_12_1,tvdmsl_6506_12_1,merge_log,gammabefore,gammaafter); % Nphi
 merge_log = zwater_6506_12_1; % TVD MSL
 [gr_exp_mod,z_log_merge_gr] = log_2_sea_level_new_2(zwater_6506_12_1,gr_water,gr_seabed,g
r_6506_12_1,tvdmsl_6506_12_1,merge_log,gammabefore,gammaafter); %
 merge_log = 326; % TVD MSL
 [rt_exp_mod,z_log_merge_rt] = log_2_sea_level_new_2(zwater_6506_12_1,rt_water,rt_seabed,r
dep_6506_12_1,tvdmsl_6506_12_1,merge_log,gammabefore,gammaafter); % Vp in m/s
```

Casing

```matlab
 id_36 = find(md_depth_6506_12_1 <= 347);
 id_26 = find(md_depth_6506_12_1 > 347 & md_depth_6506_12_1 <= 951);
 id_175 = find(md_depth_6506_12_1 > 951 & md_depth_6506_12_1 <= 2206);
 id_1225 = find(md_depth_6506_12_1 > 2206 & md_depth_6506_12_1 <= 3918);
 id_85 = find(md_depth_6506_12_1 > 3918 & md_depth_6506_12_1 <= 4554);
 id_6 = find(md_depth_6506_12_1 > 4554);
%
 bs_6506_12_1 = gr_6506_12_1*0;
 bs_6506_12_1(id_36) = 36;
 bs_6506_12_1(id_26) = 26;
 bs_6506_12_1(id_175) = 17.5;
 bs_6506_12_1(id_1225) = 12.25;
 bs_6506_12_1(id_85) = 8.5;
 bs_6506_12_1(id_6) = 6.0;
```

```matlab
 rhoma = 2.65;
 phit = (rhoma - rhob_6506_12_1)./(rhoma - rhow);
%
 rhoma = 2.65;
 phit_exp_mod = (rhoma - rhob_exp_mod)./(rhoma - rhow);
 phit_exp_mod(phit_exp_mod < 0) = 0.0;
```

```
phit_exp_mod(phit_exp_mod > 1.0) = 0.0;
```

```
gr_min = gr_exp_mod*0 + 25;
gr_max = gr_exp_mod*0 + 180;
id_top_lyr = find(z_log_merge_gr < (tops_6506_12_1(11) - rkb_6506_12_1));
gr_max(id_top_lyr) =  gr_max(id_top_lyr)*0 + 70;
id_1500 = find(z_log_merge_gr < 2000);
gr_max(id_1500) =  gr_max(id_1500)*0 + 90;
gr_min(id_1500) =  gr_min(id_1500)*0 + 30;
%

%
vsh_gr_exp_mod = (gr_exp_mod - gr_min)./(gr_max - gr_min);
%

%
vsh_gr_exp_mod(vsh_gr_exp_mod < 0) = 0.0;
vsh_gr_exp_mod(vsh_gr_exp_mod > 1.0) = 1.0;
```

From Werthmuller et al. 2013 Geophysics

```
dTdZ = (168 - 3)/((tops_6506_12_1(end) - (zwater_6506_12_1 + rkb_6506_12_1))/1e3); % C/km
t = z_log_merge_vp*0 + 3;
id_seafloor = find(z_log_merge_vp > zwater_6506_12_1);
t(id_seafloor) =  (3 + dTdZ*(((z_log_merge_vp(id_seafloor) - zwater_6506_12_1))/1e3)); %
id_rw_t25 = find(t > 5);
rw = z_log_merge_vp*0 + 0.20;
rw(id_rw_t25) = (6.8*(1 + 0.0545.*t(id_rw_t25) - 1.127e-4.*(t(id_rw_t25).^2))).^(-1);
```

Select the Garn Formation

```
id_garn_exp_mod = find(z_log_merge_rhob > (tops_6506_12_1(14) - rkb_6506_12_1) & z_log_mer
ge_rhob <= (tops_6506_12_1(15) - rkb_6506_12_1)...
                    & vsh_gr_exp_mod < 0.05); % TVD/MSL
```

properties of lyr_spekke_melke

```
[~,cell_top]=min(abs(z_log_merge_rhob-3813));
[~,cell_bottom]=min(abs(z_log_merge_rhob-3974));
```

Stress calculations

```
dz = diff(z_log_merge_rhob);
sig_lith = cumsum(9.81*(rhob_exp_mod(1:end-1,1)*1e3).*dz);
%
rhow_profile = rhob_exp_mod(1:end-1,1).*0 + rhow;
P_pore = cumsum(9.81*(rhow_profile*1e3).*dz);
P_pore_Nord=cumsum(9.81*1.84*dz);
%
P_diff = sig_lith - P_pore;
```

Compute water saturation in the Garn formation assuming Arctie eq.

```
sw = (rw./((phit_exp_mod.^2).*rt_exp_mod)).^(1/2);
sw_mean = mean(sw(id_garn_exp_mod));
```

Vs prediction using Han relation

vs_han_sand = 4.06 - 6.28.*(phit_exp_mod); % km/s

```
vs_han_vcl = 3.52 - 4.91*(phit_exp_mod) - 1.89*(vsh_gr_exp_mod); % km/s
```

Matrix bulk stiffness

```
kma = 36.1; % Assuming 100% Quartz in matrix
```

Temp and pressure in Garn Fm.

```
temp_garn = mean(t(id_garn_exp_mod)); % Temperature in Celcius
pore_garn = mean(P_pore(id_garn_exp_mod))/1e6; % Pore pressure in MPa
```

Oil prop

```
api = 45;
dstd = (141.5./(api + 131.5))*1e3; % kg/m^3
gasinoil = 1;
gor = 25;
mwgt = 80;
[koil,rhooil] = moil(temp_garn,pore_garn,dstd,gasinoil,gor,mwgt);
koil = koil/1e9; % GPa
rhooil = rhooil/1e3; % g/cc
```

Brine prop

```
sali = 34000./1e6; % ppm
[kbrine,rhobrine]= mbrine(temp_garn,pore_garn,sali);
kbrine = kbrine/1e9; % GPa
rhobrine = rhobrine/1e3; % g/cc
```

Compute bulk modulus of fluid mix

```
k_mix = 1./(((1 - sw_mean)./koil) + (sw_mean./kbrine)).^1);
%
rho_mix = (1 - sw_mean).*rhooil + (sw_mean.*rhobrine);
```

Correct density and porosity log

```
rhob_exp_mod(id_garn_exp_mod) = ((1 - phit_exp_mod(id_garn_exp_mod)).*rhoma) + (phit_exp_
```

```
mod(id_garn_exp_mod)*rho_mix);
 phit_exp_mod(id_garn_exp_mod) = (rhoma - rhob_exp_mod(id_garn_exp_mod))./(rhoma - rho_mix
);
 phit_exp_mod(1:(id_seafloor(1)-1),1) = 0;
```

Compute Vcl_dry

```
nphi_sand = 0.025; % Correct for Limestone reference
nphi_cl = 40;
vcl_nphi_phit = ((nphi_exp_mod - phit_exp_mod+ nphi_sand)*(100/nphi_cl));
```

Adjust Vsh

```
vqz = 1 - (phit_exp_mod + vsh_gr_exp_mod);
id_qz = find(vqz < 0);
vqz(id_qz) = 0;
vsh_gr_exp_mod = 1 - (phit_exp_mod + vqz);
```

Compute bulk and shear modulus

```
ksat = rhob_exp_mod.*((vp_exp_mod/1e3).^2 - (4/3)*vs_han_vcl.^2); % Saturated bulk modulu
s
gdry = rhob_exp_mod.*(vs_han_vcl.^2); % Dry shear modulus
```

Inverse Gassmann to estimate bulk frame modulus K_dry

```
[kdry_garn] = Invertgassmann(ksat(id_garn_exp_mod),kma,k_mix,phit_exp_mod(id_garn_exp_mod
));
```

Forward gassmann assuming 100% brine

```
[ksat_sw100] = Gassmann(kdry_garn,kbrine,kma,phit_exp_mod(id_garn_exp_mod));
rhob_sw100 = ((1 - phit_exp_mod(id_garn_exp_mod)).*rhoma) + (phit_exp_mod(id_garn_exp_mod
)*rhobrine);
```

New velocities

```
vp_sw100 = sqrt((ksat_sw100 + (4/3).*gdry(id_garn_exp_mod))./rhob_sw100);
vs_han_vcl(id_garn_exp_mod) = sqrt(gdry(id_garn_exp_mod)./rhob_sw100);
%
vp_exp_mod_sw100 = zeros((length(vp_exp_mod)),1);
vp_exp_mod_sw100 = vp_exp_mod;
vp_exp_mod_sw100(id_garn_exp_mod) = vp_sw100*1e3;
%
rhob_exp_mod_sw100 = zeros((length(rhob_exp_mod)),1);
rhob_exp_mod_sw100 = rhob_exp_mod;
rhob_exp_mod_sw100(id_garn_exp_mod) = rhob_sw100;

id_lyr_spekk_melke = find(z_log_merge_vp > (tops_6506_12_1(11) - rkb_6506_12_1) & z_log_m
erge_vp < (tops_6506_12_1(14) - rkb_6506_12_1));
```

```
vel_lyr_spekke_melke=mean(vp_exp_mod_sw100 (id_lyr_spekk_melke))

dens_lyr_spekke_melke=mean(rhob_exp_mod_sw100(id_lyr_spekk_melke))
```

```
vel_lyr_spekke_melke =

   3.3962e+03


dens_lyr_spekke_melke =

   2.4636
```

```
c33_m = ((vsh_gr_exp_mod./33) + ((1 - vsh_gr_exp_mod)./(37 + (4/3)*44))).^-1;
c33 = c33_m.*((1 - phit_exp_mod).^(5.2 - 1.3.*vsh_gr_exp_mod));
rhoma_vernik = ((1 - vsh_gr_exp_mod).*2.65) + (vsh_gr_exp_mod*2.60);
rhob_vernik = (((1 - phit_exp_mod).*rhoma_vernik) + (rhow.*phit_exp_mod));
vp_vernik = sqrt(c33./rhob_vernik);
```

Raymer-Hunt

```
vma_exp_mod = ((vqz./(1 - phit_exp_mod)).*(1/6.08) + ((vsh_gr_exp_mod)./(1 - phit_exp_mod
)).*(1./(sqrt(33/2.65)))).^-1;
%
vp_log_raymer_exp_mod = ((1 - phit_exp_mod).^2).*vma_exp_mod + (phit_exp_mod.*1.5);
```

Compute alpha of Roste

```
alfa_Raymer = ((-2*((1 - phit_exp_mod).^2).*vma_exp_mod) + ((1 - phit_exp_mod).*1.5))./vp
_log_raymer_exp_mod;
```

```
flag = 1;
[vs_GC_sst] = greenberg_cast((vp_exp_mod_sw100/1e3),flag);
flag = 2;
[vs_GC_sh] = greenberg_cast((vp_exp_mod_sw100/1e3),flag);
vs_GC_arith = (1 - vsh_gr_exp_mod).*vs_GC_sst + vsh_gr_exp_mod.*vs_GC_sh;
vs_GC_harm = (((1 - vsh_gr_exp_mod)./vs_GC_sst) + (vsh_gr_exp_mod./vs_GC_sh)).^-1;
vs_GC = 0.5*(vs_GC_arith + vs_GC_harm);
```

```
vp_mean_garn = median(vp_exp_mod_sw100(id_garn_exp_mod))/1e3
%
vs_mean_garn = median(vs_GC(id_garn_exp_mod))
%
rhob_mean_garn = median(rhob_exp_mod_sw100(id_garn_exp_mod))
```

```
vp_mean_garn =
```

```
    4.5383
```

```
vs_mean_garn =
```

```
    2.7924
```

```
rhob_mean_garn =
```

```
    2.4164
```

Vs from Mudrock eq.

```
id_garn_2_TD = find((z_log_merge_vp > (tops_6506_12_1(14) - rkb_6506_12_1)));
vs_mudrock = 0.862.*(vp_exp_mod_sw100/1e3) - 1.172;
vs_mudrock(id_garn_2_TD) = 0.892.*(vp_exp_mod_sw100(id_garn_2_TD)/1e3) - 1.172;
```

Oygarden et al.

```
id_brygge = find((z_log_merge_vp > (tops_6506_12_1(3) - rkb_6506_12_1)) & (z_log_merge_vp
<= (tops_6506_12_1(4) - rkb_6506_12_1)));
vs_mudrock(id_brygge) = ((vp_exp_mod(id_brygge)/0.92) - ((1225.25.*(1 + 0.2*(rhob_exp_mod
(id_brygge) - 1.8)))/0.92))/1e3;
%  vs_mudrock(id_brygge) = ((vp_exp_mod(id_brygge)/0.92) - 1225.25/0.92)/1e3; % result in
km/s
```

Vs in Lyr Fm

```
id_lyr = find(z_log_merge_vp > (tops_6506_12_1(11) - rkb_6506_12_1) & z_log_merge_vp < (t
ops_6506_12_1(12) - rkb_6506_12_1));
%
vs_mudrock(id_lyr) = (vp_exp_mod_sw100(id_lyr)/1e3)/1.91;
vs_GC(id_lyr) = (vp_exp_mod_sw100(id_lyr)/1e3)/1.91;

a=mean(vp_exp_mod(id_lyr))


% lyr_spekke_melke depth

vs_mudrock_lyr_spekke_melke=mean(vp_exp_mod_sw100(id_lyr_spekk_melke)/1e3)/1.91;
```

```
a =
```

```
    3.3037e+03
```

Remove Spekk and Melke Formations

```
id_b_lyr = find(z_log_merge_vp < (tops_6506_12_1(12) - rkb_6506_12_1));
id_tgarn_td = find(z_log_merge_vp > (tops_6506_12_1(14) - rkb_6506_12_1));
```

```matlab
%
 vp_exp_mod_sw100_nospekk = vp_exp_mod*0 - 999.250;
 vp_exp_mod_sw100_nospekk(id_b_lyr) = vp_exp_mod_sw100(id_b_lyr);
 vp_exp_mod_sw100_nospekk((id_b_lyr(end)+1):(id_b_lyr(end)+(length(id_tgarn_td))),1) = vp_
exp_mod_sw100(id_tgarn_td);
%
 vs_exp_mod_sw100_nospekk = vs_mudrock*0 - 999.250;
 vs_exp_mod_sw100_nospekk(id_b_lyr) = vs_mudrock(id_b_lyr);
 vs_exp_mod_sw100_nospekk((id_b_lyr(end)+1):(id_b_lyr(end)+(length(id_tgarn_td))),1) = vs_
mudrock(id_tgarn_td);
%
 rhob_exp_mod_sw100_nospekk = rhob_exp_mod*0 - 999.250;
 rhob_exp_mod_sw100_nospekk(id_b_lyr) = rhob_exp_mod_sw100(id_b_lyr);
 rhob_exp_mod_sw100_nospekk((id_b_lyr(end)+1):(id_b_lyr(end)+(length(id_tgarn_td))),1) = r
hob_exp_mod_sw100(id_tgarn_td);
%
 phit_exp_mod_sw100_nospekk = phit_exp_mod*0 - 999.250;
 phit_exp_mod_sw100_nospekk = (rhoma - rhob_exp_mod_sw100_nospekk)./(rhoma - rhow);
 phit_exp_mod_sw100_nospekk((id_b_lyr(end)+1):(id_b_lyr(end)+(length(id_tgarn_td))),1) = (
rhoma - rhob_exp_mod_sw100(id_tgarn_td))./(rhoma - rhobrine);
 phit_exp_mod_sw100_nospekk(phit_exp_mod_sw100_nospekk > 1.0) = -999.250;
 phit_exp_mod_sw100_nospekk(1:(id_seafloor(1)-1),1) = 0;
```

BHplottops_6506_12_1_adj;

Compute median values within the Lyr and Garn Fms

```matlab
 id_lyr = find(z_log_merge_vp > (tops_6506_12_1(11) - rkb_6506_12_1) & z_log_merge_vp < (t
ops_6506_12_1(12) - rkb_6506_12_1));
 id_garn_fm = find(z_log_merge_vp > (tops_6506_12_1(12) - rkb_6506_12_1) & z_log_merge_vp
< (tops_6506_12_1(13) - rkb_6506_12_1));
 vp_mean_lyr = median(vp_exp_mod_sw100_nospekk(id_lyr))/1e3
 vp_mean_garn = median(vp_exp_mod_sw100_nospekk(id_garn_fm))/1e3
%
 vs_mean_lyr = median(vs_exp_mod_sw100_nospekk(id_lyr))
 vs_mean_garn = median(vs_exp_mod_sw100_nospekk(id_garn_fm))
%
 rhob_mean_lyr = median(rhob_exp_mod_sw100_nospekk(id_lyr))
 rhob_mean_garn = median(rhob_exp_mod_sw100_nospekk(id_garn_fm))
%
 max_depth = 5.5;
 figure(1);
 subplot(1,5,1);
 h = plot(gr_6506_12_1,tvdmsl_6506_12_1/1e3,'r','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 200 0 max_depth]);
 xlabel('GR (gAPI)','fontsize',10);
 ylabel('TVD/MSL (km)','fontsize',14);
 grid
 hold on
 h = plot(bs_6506_12_1,tvdmsl_6506_12_1/1e3,'r','LineWidth',2);
 h = plot(cali_6506_12_1,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,2);
 h = plot(vp_6506_12_1/1e3,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
```

```matlab
axis([1.5 5.5 0 max_depth]);
xlabel('Vp (km/s)','fontsize',10);
grid
hold on
h = plot(vp_exp_mod/1e3,z_log_merge_vp/1e3,'r','LineWidth',1);
htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
subplot(1,5,3);
h = plot(rhob_6506_12_1,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
set(gca,'ydir','reverse')
set(gca,'fontweight','bold','fontsize',10);
axis([1.45 2.75 0 max_depth]);
xlabel('RhoB (g/cc)','fontsize',10);
grid
hold on
h = plot(rhob_exp_mod,z_log_merge_rhob/1e3,'r','LineWidth',1);
htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
subplot(1,5,4);
h = plot(phit,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
set(gca,'ydir','reverse')
set(gca,'fontweight','bold','fontsize',10);
axis([0 1 0 max_depth]);
xlabel('Porosity (frac)','fontsize',10);
grid
hold on
h = plot(phit_exp_mod,z_log_merge_rhob/1e3,'g','LineWidth',1);
h = plot(nphi_6506_12_1,tvdmsl_6506_12_1/1e3,'b','LineWidth',1);
h = plot(nphi_exp_mod,z_log_merge_nphi/1e3,'r','LineWidth',1);
htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
subplot(1,5,5);
h = semilogx(rdep_6506_12_1,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
set(gca,'ydir','reverse')
set(gca,'fontweight','bold','fontsize',10);
axis([0.01 2000 0 max_depth]);
xlabel('R_{deep} (ohmm)','fontsize',10);
grid
hold on
h = semilogx(rt_exp_mod,z_log_merge_rt/1e3,'r','LineWidth',1);
htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),topnames_6506_12_1);
subplot_title('Well 6506/12-1');
%
print -dtiff fig1.tiff;
%
figure(2);
h = plot(sig_lith/1e6,z_log_merge_rt(1:end-1,1)/1e3,'r','LineWidth',3);
set(gca,'ydir','reverse')
set(gca,'fontweight','bold','fontsize',12);
axis([0 150 0 max_depth]);
xlabel('Stress (MPa)','fontsize',14);
ylabel('TVD/MSL (km)','fontsize',14);
grid
hold on
h = plot(P_pore/1e6,z_log_merge_rt(1:end-1,1)/1e3,'b','LineWidth',3);
h= plot(P_pore_Nord/1e3,z_log_merge_rt(1:end-1,1)/1e3,'m','LineWidth',3);
h = plot(P_diff/1e6,z_log_merge_rt(1:end-1,1)/1e3,'g','LineWidth',3);
h = plot([36],[3974 - rkb_6506_12_1]/1e3,'marker','o','markeredgecolor','k','markerfaceco
lor','g','LineStyle','none');
h = plot([ 67.5],[3974 - rkb_6506_12_1]/1e3,'marker','o','markeredgecolor','k','markerfac
ecolor','b','LineStyle','none');
```

```matlab
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),topnames_6506_12_1);
 h = legend('Litho.stress','Hyd.press','Hyd-Press Nordgaard','Diff.stress','Diff. stress N
ordgaard','Pore-Pressure Nordgaard',1);
 h = title('Well 6506/12-1','fontsize',16);
%
 print -dtiff fig2.tiff;
%
 figure(3);
 h = plot(t,z_log_merge_vp/1e3,'r','LineWidth',3);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',12);
 axis([0 150 0 max_depth]);
 xlabel('Temperature (^0/C)','fontsize',14);
 ylabel('TVD/MSL (km)','fontsize',14);
 grid
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),topnames_6506_12_1);
%
 figure(4);
 subplot(1,5,1);
 h = plot(gr_6506_12_1,tvdmsl_6506_12_1/1e3,'g','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 200 0 max_depth]);
 xlabel('GR (gAPI)','fontsize',10);
 ylabel('TVD/MSL (km)','fontsize',14);
 grid
 hold on
 h = plot(gr_exp_mod,z_log_merge_gr/1e3,'g','LineWidth',1);
 h = plot((gr_exp_mod*0 + gr_min),z_log_merge_gr/1e3,'b','LineWidth',1);
 h = plot((gr_exp_mod*0 + gr_max),z_log_merge_gr/1e3,'b','LineWidth',1);
 h = plot(bs_6506_12_1,tvdmsl_6506_12_1/1e3,'r','LineWidth',2);
 h = plot(cali_6506_12_1,tvdmsl_6506_12_1/1e3,'--k','LineWidth',2);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,2);
 h = plot(phit_exp_mod,z_log_merge_rhob/1e3,'r','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 1 0 max_depth]);
 xlabel('Phit (frac)','fontsize',10);
 grid
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,3);
 h = plot(vsh_gr_exp_mod,z_log_merge_gr/1e3,'g','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 1 0 max_depth]);
 xlabel('Vcl (frac)','fontsize',10);
 grid
%  hold on
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,4);
 h = plot(vqz,z_log_merge_rhob/1e3,'y','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 1 0 max_depth]);
 xlabel('Vqz (frac)','fontsize',10);
 grid
 hold on
```

```matlab
 h = plot((vqz + vsh_gr_exp_mod + phit_exp_mod),z_log_merge_rhob/1e3,'b','LineWidth',2);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,5);
  set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 1 0 max_depth]);
 xlabel('Vcl_{NPhi}(frac)','fontsize',10);
 grid
 hold on
 h = plot(vcl_nphi_phit,z_log_merge_nphi/1e3,'b','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),topnames_6506_12_1);
 subplot_title('Well 6506/12-1');
%
 print -dtiff fig4.tiff;
%
 figure(5);
 subplot(1,5,1);
 h = plot(vsh_gr_exp_mod*100,z_log_merge_gr/1e3,'g','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 100 0 max_depth]);
 xlabel('Vcl (frac)','fontsize',10);
 ylabel('TVD/MSL (km)','fontsize',14);
 grid
 hold on
 h = plot(bs_6506_12_1,tvdmsl_6506_12_1/1e3,'r','LineWidth',2);
 h = plot(cali_6506_12_1,tvdmsl_6506_12_1/1e3,'--k','LineWidth',2);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,2);
 h = plot(vp_6506_12_1/1e3,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([1 5 0 max_depth]);
 xlabel('Vp (km/s)','fontsize',10);
 grid
 hold on
 h = plot((vp_exp_mod*0 + 1.5),z_log_merge_vp/1e3,'b','LineWidth',1);
 h = plot(vp_exp_mod/1e3,z_log_merge_vp/1e3,'r','LineWidth',1);
 h = plot(vp_vernik,z_log_merge_vp/1e3,'c','LineWidth',1);
 h = plot(vp_exp_mod/1e3,z_log_merge_vp/1e3,'r','LineWidth',1);
 h = plot(vp_log_raymer_exp_mod,z_log_merge_vp/1e3,'g','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,3);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 4 0 max_depth]);
 xlabel('Vs-GC (km/s)','fontsize',10);
 grid
 hold on
 h = plot(vs_GC,z_log_merge_vp/1e3,'g','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,4);
 h = plot(rhob_6506_12_1,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([1.45 2.95 0 max_depth]);
 xlabel('RhoB (g/cc)','fontsize',10);
```

```matlab
 grid
 hold on
 h = plot(rhob_exp_mod,z_log_merge_rhob/1e3,'r','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,5);
 h = plot(((((vp_exp_mod/1e3)./vs_mudrock)*0+sqrt(2)),z_log_merge_vp/1e3,'r','LineWidth',1)
;
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([1 5 0 max_depth]);
 xlabel('Vp/Vs','fontsize',10);
 grid
 hold on
 h = plot(((vp_exp_mod/1e3)./vs_GC),z_log_merge_vp/1e3,'g','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),topnames_6506_12_1);
 subplot_title('Well 6506/12-1');
%
 print -dtiff fig5.tiff;
%
 figure(6)
 h = plot(vcl_nphi_phit(id_tgarn_td),vsh_gr_exp_mod(id_garn_2_TD),'marker','o','markeredge
color','k','markerfacecolor','g','LineStyle','none');
 set(h,'markersize',8);
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 1 0 1]);
 xlabel('Vcl_{NPhi}(frac)','fontsize',14);
 ylabel('Vcl_{GR}(frac)','fontsize',14);
 grid
 hold on
 h = plot([0.0,1.0],[0.0,1.0],'y','LineWidth',3);
%
 figure(7);
 subplot(1,5,1);
 h = plot(vsh_gr_exp_mod*100,z_log_merge_gr/1e3,'g','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 100 0 max_depth]);
 xlabel('Vcl (frac)','fontsize',10);
 ylabel('TVD/MSL (km)','fontsize',14);
 grid
 hold on
 h = plot(bs_6506_12_1,tvdmsl_6506_12_1/1e3,'r','LineWidth',2);
 h = plot(cali_6506_12_1,tvdmsl_6506_12_1/1e3,'--k','LineWidth',2);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,2);
 h = plot(vp_6506_12_1/1e3,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([1 5 0 max_depth]);
 xlabel('Vp (km/s)','fontsize',10);
 grid
 hold on
 h = plot((vp_exp_mod*0 + 1.5),z_log_merge_vp/1e3,'b','LineWidth',1);
 h = plot(vp_exp_mod/1e3,z_log_merge_vp/1e3,'r','LineWidth',1);
 h = plot(vp_vernik,z_log_merge_vp/1e3,'c','LineWidth',1);
 h = plot(vp_exp_mod/1e3,z_log_merge_vp/1e3,'r','LineWidth',1);
 h = plot(vp_log_raymer_exp_mod,z_log_merge_vp/1e3,'g','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
```

```matlab
 subplot(1,5,3);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([0 4 0 max_depth]);
 xlabel('Vs-GC (km/s)','fontsize',10);
 grid
 hold on

 h = plot(vs_GC,z_log_merge_vp/1e3,'g','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,4);
 h = plot(rhob_6506_12_1,tvdmsl_6506_12_1/1e3,'k','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([1.45 2.95 0 max_depth]);
 xlabel('RhoB (g/cc)','fontsize',10);
 grid
 hold on
 h = plot(rhob_exp_mod,z_log_merge_rhob/1e3,'r','LineWidth',1);
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),blkvec);
%
 subplot(1,5,5);
 h = plot(alfa_Raymer,z_log_merge_vp/1e3,'r','LineWidth',1);
 set(gca,'ydir','reverse')
 set(gca,'fontweight','bold','fontsize',10);
 axis([-2 0 0 max_depth]);
 xlabel('\alpha','fontsize',10);
 grid
 htops = plottops(((tops_6506_12_1 - rkb_6506_12_1)/1e3),topnames_6506_12_1);
 subplot_title('Well 6506/12-1');
%
 print -dtiff fig7.tiff;
%
```

```
vp_mean_lyr =

    3.2616


vp_mean_garn =

    4.2927


vs_mean_lyr =

    1.7076


vs_mean_garn =

    2.6571


rhob_mean_lyr =

    2.5588
```