Supplementary Material 1a:

Probabilistic Backstripping code in Matlab

The Messinian PWD at four locations in the Mediterranean was estimated using the backstripping equations of Sclater and Christie (1980) and Allen and Allen (2013) (S1a, b) with probabilistic input distributions to demonstrate the uncertainty in the estimates (Figure 2). These locations are from west to east: (1) the distal Gulf of Lyons, (2) the Ionian basin, (3) The Herodotus basin and (4) the center of the Levantine basin (Figures 2A, B, 3). These locations were chosen in the deepest parts of the basin, where the stratigraphy is well imaged and in areas with minimal post-salt thermal or flexural subsidence.

Ionian Basin:

clc

clear all

%INPUT%

WD = 3360; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS (=post messinian)%

%Top of unit B, HS, ML, LS

TopB\_ML = 5945; % Most likely top B

TopB\_HS = 6000; % High estimate top B

TopB\_LS = 5900; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.02;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2210; %dry grain density (ML)

rhoA\_HS = 2250; %dry grain density (HS)

rhoA\_LS = 2200; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700; % Most likely top B

BasB\_HS = TopB\_HS+2000; % High estimate top B

BasB\_LS = TopB\_LS+1500; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.5;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2670; %dry grain density (ML)

rhoB\_HS = 2710; %dry grain density (HS)

rhoB\_LS = 2650; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Drawdown values

Draw\_ML = 1650; %Drawdown values

Draw\_HS = 2000;

Draw\_LS = 1400;

% %CALCULATIONS%

%Unit A porosity Vs depth

Z\_A\_ML = linspace(0,(TopB\_ML-WD),11);

PhiAML = Phi0A\*(exp(-1\*(C\_unA\_ML)\*(Z\_A\_ML/1000)));

AvgPhiA\_ML = mean(PhiAML);

Z\_A\_HS = linspace(0,(TopB\_LS-WD),11);

PhiAHS = Phi0A\*(exp(-1\*(C\_unA\_HS)\*(Z\_A\_HS/1000)));

AvgPhiA\_HS = mean(PhiAHS);

Z\_A\_LS = linspace(0,(TopB\_HS-WD),11);

PhiALS = Phi0A\*(exp(-1\*(C\_unA\_LS)\*(Z\_A\_LS/1000)));

AvgPhiA\_LS = mean(PhiALS);

%Unit B porosity Vs depth present day

Z\_B\_ML = linspace((TopB\_ML-WD),(BasB\_ML-WD),11);

PhiBML = Phi0B\*(exp(-1\*(C\_unB\_ML)\*(Z\_B\_ML/1000)));

AvgPhiB\_ML = mean(PhiBML);

Z\_B\_HS = linspace((TopB\_LS-WD),(BasB\_LS-WD),11);

PhiBHS = Phi0B\*(exp(-1\*(C\_unB\_HS)\*(Z\_B\_HS/1000)));

AvgPhiB\_HS = mean(PhiBHS);

Z\_B\_LS = linspace((TopB\_HS-WD),(BasB\_HS-WD),11);

PhiBLS = Phi0B\*(exp(-1\*(C\_unB\_LS)\*(Z\_B\_LS/1000)));

AvgPhiB\_LS = mean(PhiBLS);

%Unit B porosity Vs depth backstripped

%ML calculation

Z\_Bi1\_ML = linspace(0,(BasB\_ML-TopB\_ML),11); %uncompacted porosity trend

PhiBi1ML = Phi0B\*(exp(-1\*(C\_unB\_ML)\*(Z\_Bi1\_ML/1000)));

AvgPhi1Bi\_ML = mean(PhiBi1ML);

ToB1 = (BasB\_ML-TopB\_ML)\*((1-AvgPhiB\_ML)/(1-AvgPhi1Bi\_ML));

Z\_Bi2\_ML = linspace(0,(ToB1),11); %uncompacted porosity trend

PhiBi2ML = Phi0B\*(exp(-1\*(C\_unB\_ML)\*(Z\_Bi2\_ML/1000)));

AvgPhi2Bi\_ML = mean(PhiBi2ML);

ToB2 = (BasB\_ML-TopB\_ML)\*((1-AvgPhiB\_ML)/(1-AvgPhi2Bi\_ML));

Z\_Bi3\_ML = linspace(0,(ToB2),11); %uncompacted porosity trend

PhiBi3ML = Phi0B\*(exp(-1\*(C\_unB\_ML)\*(Z\_Bi3\_ML/1000)));

AvgPhi3Bi\_ML = mean(PhiBi3ML);

ToB3 = (BasB\_ML-TopB\_ML)\*((1-AvgPhiB\_ML)/(1-AvgPhi3Bi\_ML));

Z\_Bi4\_ML = linspace(0,(ToB3),11); %uncompacted porosity trend

PhiBi4ML = Phi0B\*(exp(-1\*(C\_unB\_ML)\*(Z\_Bi4\_ML/1000)));

AvgPhi4Bi\_ML = mean(PhiBi4ML);

ToB4 = (BasB\_ML-TopB\_ML)\*((1-AvgPhiB\_ML)/(1-AvgPhi4Bi\_ML));

Z\_Bi5\_ML = linspace(0,(ToB4),11); %uncompacted porosity trend

PhiBi5ML = Phi0B\*(exp(-1\*(C\_unB\_ML)\*(Z\_Bi5\_ML/1000)));

AvgPhi5Bi\_ML = mean(PhiBi5ML);%<---------------------------------------

%HS calculation

Z\_Bi1\_HS = linspace(0,(BasB\_LS-TopB\_LS),11); %uncompacted porosity trend

PhiBi1HS = Phi0B\*(exp(-1\*(C\_unB\_HS)\*(Z\_Bi1\_HS/1000)));

AvgPhi1Bi\_HS = mean(PhiBi1HS);

ToB1\_HS = (BasB\_LS-TopB\_LS)\*((1-AvgPhiB\_HS)/(1-AvgPhi1Bi\_HS));

Z\_Bi2\_HS = linspace(0,(ToB1\_HS),11); %uncompacted porosity trend

PhiBi2HS = Phi0B\*(exp(-1\*(C\_unB\_HS)\*(Z\_Bi2\_HS/1000)));

AvgPhi2Bi\_HS = mean(PhiBi2HS);

ToB2\_HS = (BasB\_LS-TopB\_LS)\*((1-AvgPhiB\_HS)/(1-AvgPhi2Bi\_HS));

Z\_Bi3\_HS = linspace(0,(ToB2\_HS),11); %uncompacted porosity trend

PhiBi3HS = Phi0B\*(exp(-1\*(C\_unB\_HS)\*(Z\_Bi3\_HS/1000)));

AvgPhi3Bi\_HS = mean(PhiBi3HS);

ToB3\_HS = (BasB\_LS-TopB\_LS)\*((1-AvgPhiB\_HS)/(1-AvgPhi3Bi\_HS));

Z\_Bi4\_HS = linspace(0,(ToB3\_HS),11); %uncompacted porosity trend

PhiBi4HS = Phi0B\*(exp(-1\*(C\_unB\_HS)\*(Z\_Bi4\_HS/1000)));

AvgPhi4Bi\_HS = mean(PhiBi4HS);

ToB4\_HS = (BasB\_LS-TopB\_LS)\*((1-AvgPhiB\_HS)/(1-AvgPhi4Bi\_HS));

Z\_Bi5\_HS = linspace(0,(ToB4\_HS),11); %uncompacted porosity trend

PhiBi5HS = Phi0B\*(exp(-1\*(C\_unB\_HS)\*(Z\_Bi5\_HS/1000)));

AvgPhi5Bi\_HS = mean(PhiBi5HS);%<-----------------------------------------------

%LS calculation

Z\_Bi1\_LS = linspace(0,(BasB\_HS-TopB\_HS),11); %uncompacted porosity trend

PhiBi1LS = Phi0B\*(exp(-1\*(C\_unB\_LS)\*(Z\_Bi1\_LS/1000)));

AvgPhi1Bi\_LS = mean(PhiBi1LS);

ToB1\_LS = (BasB\_HS-TopB\_HS)\*((1-AvgPhiB\_LS)/(1-AvgPhi1Bi\_LS));

Z\_Bi2\_LS = linspace(0,(ToB1\_LS),11); %uncompacted porosity trend

PhiBi2LS = Phi0B\*(exp(-1\*(C\_unB\_LS)\*(Z\_Bi2\_LS/1000)));

AvgPhi2Bi\_LS = mean(PhiBi2LS);

ToB2\_LS = (BasB\_HS-TopB\_HS)\*((1-AvgPhiB\_LS)/(1-AvgPhi2Bi\_LS));

Z\_Bi3\_LS = linspace(0,(ToB2\_LS),11); %uncompacted porosity trend

PhiBi3LS = Phi0B\*(exp(-1\*(C\_unB\_LS)\*(Z\_Bi3\_LS/1000)));

AvgPhi3Bi\_LS = mean(PhiBi3LS);

ToB3\_LS = (BasB\_HS-TopB\_HS)\*((1-AvgPhiB\_LS)/(1-AvgPhi3Bi\_LS));

Z\_Bi4\_LS = linspace(0,(ToB3\_LS),11); %uncompacted porosity trend

PhiBi4LS = Phi0B\*(exp(-1\*(C\_unB\_LS)\*(Z\_Bi4\_LS/1000)));

AvgPhi4Bi\_LS = mean(PhiBi4LS);

ToB4\_LS = (BasB\_HS-TopB\_HS)\*((1-AvgPhiB\_LS)/(1-AvgPhi4Bi\_LS));

Z\_Bi5\_LS = linspace(0,(ToB4\_LS),11); %uncompacted porosity trend

PhiBi5LS = Phi0B\*(exp(-1\*(C\_unB\_LS)\*(Z\_Bi5\_LS/1000)));

AvgPhi5Bi\_LS = mean(PhiBi5LS);%<-------------------------------------------

% Bas\_Bi\_LS = (BasB\_LS-TopB\_HS)\*((1-AvgPhiB\_LS)/(1-AvgPhi5Bi\_LS));%<---------------------

% Bas\_Bi\_HS = (BasB\_HS-TopB\_LS)\*((1-AvgPhiB\_HS)/(1-AvgPhi5Bi\_HS));%<---------------------

% Bas\_Bi\_ML = (BasB\_ML-TopB\_ML)\*((1-AvgPhiB\_ML)/(1-AvgPhi5Bi\_ML));%<-------------

%Random Variables%

n = Trial;

n\_ones = linspace(1,1,n);

rand\_noise = transpose(0.9+(0.2.\*rand(n,1)));

%DENSITY DISTRIBUTIONS%

%Unit A present day%

M\_A = (AvgPhiA\_ML-AvgPhiA\_LS)/(AvgPhiA\_HS-AvgPhiA\_LS);

a = 3;

b\_A = 2-a+(a/M\_A)-(1/M\_A);

RandPhiA = AvgPhiA\_LS+((AvgPhiA\_HS-AvgPhiA\_LS)\*betarnd(a,b\_A,1,n));

M\_rhoA = (rhoA\_ML-rhoA\_LS)/(rhoA\_HS-rhoA\_LS);

a\_rhoA = 3\*Kurt\_rhoA;

b\_rhoA = 2-a\_rhoA+(a\_rhoA/M\_rhoA)-(1/M\_rhoA);

RandRho\_A = rhoA\_LS+((rhoA\_HS-rhoA\_LS)\*betarnd(a\_rhoA,b\_rhoA,1,n));

Rho\_A = (RandPhiA.\*rhoW)+((1-RandPhiA).\*(RandRho\_A)); %Present day density of unit A

%Unit B present day%

M\_B = (AvgPhiB\_ML-AvgPhiB\_LS)/(AvgPhiB\_HS-AvgPhiB\_LS);

b\_B = 2-a+(a/M\_B)-(1/M\_B);

RandPhiB = AvgPhiB\_LS+((AvgPhiB\_HS-AvgPhiB\_LS)\*betarnd(a,b\_B,1,n));

M\_rhoB = (rhoB\_ML-rhoB\_LS)/(rhoB\_HS-rhoB\_LS);

a\_rhoB = 3\*Kurt\_rhoB;

b\_rhoB = 2-a\_rhoB+(a\_rhoB/M\_rhoB)-(1/M\_rhoB);

RandRho\_B = rhoB\_LS+((rhoB\_HS-rhoB\_LS)\*betarnd(a\_rhoB,b\_rhoB,1,n));

Rho\_B = (RandPhiB.\*rhoW)+((1-RandPhiB).\*(RandRho\_B)); %present day density of uinit B

%Unit B original%

M\_Bi = (AvgPhi5Bi\_ML-AvgPhi5Bi\_LS)/(AvgPhi5Bi\_HS-AvgPhi5Bi\_LS);

b\_Bi = 2-a+(a/M\_Bi)-(1/M\_Bi);

RandPhiBi = AvgPhi5Bi\_LS+((AvgPhi5Bi\_HS-AvgPhi5Bi\_LS)\*betarnd(a,b\_Bi,1,n));

Rho\_Bi = (RandPhiBi.\*rhoW)+((1-RandPhiBi).\*(RandRho\_B)); %Original density of uinit B

%Mantle

M\_rhoM = (rhoM\_ML-rhoM\_LS)/(rhoM\_HS-rhoM\_LS);

a\_rhoM = 3\*Kurt\_rhoM;

b\_rhoM = 2-a\_rhoM+(a\_rhoM/M\_rhoM)-(1/M\_rhoM);

Rho\_M = rhoM\_LS+((rhoM\_HS-rhoM\_LS)\*betarnd(a\_rhoM,b\_rhoM,1,n)); %Mantle density

%THICKNESS DISTRIBUTIONS%

%Unit A

UnitA\_ML = TopB\_ML-WD;

UnitA\_HS = TopB\_HS-WD;

UnitA\_LS = TopB\_LS-WD;

M\_UnitA = (UnitA\_ML-UnitA\_LS)/(UnitA\_HS-UnitA\_LS);

a\_UnitA = 3\*Kurt\_TB;

b\_UnitA = 2-a\_UnitA+(a\_UnitA/M\_UnitA)-(1/M\_UnitA);

Thick\_A = UnitA\_LS+((UnitA\_HS-UnitA\_LS)\*betarnd(a\_UnitA,b\_UnitA,1,n)); %Thickness of Unit A

%Unit B present day

UnitB\_ML = BasB\_ML-TopB\_ML;

UnitB\_HS = BasB\_HS-TopB\_LS;

UnitB\_LS = BasB\_LS-TopB\_HS;

M\_UnitB = (UnitB\_ML-UnitB\_LS)/(UnitB\_HS-UnitB\_LS);

a\_UnitB = 3\*Kurt\_BB;

b\_UnitB = 2-a\_UnitB+(a\_UnitB/M\_UnitB)-(1/M\_UnitB);

Thick\_B = UnitB\_LS+((UnitB\_HS-UnitB\_LS)\*betarnd(a\_UnitB,b\_UnitB,1,n)); %Thickness of Unit B today

%Unit B initial thickness

% ExpF = Bas\_Bi\_ML/UnitB\_ML;

% Thick\_Bi = Thick\_B.\*ExpF;

exp\_Ratio = (gsubtract(n\_ones,RandPhiB))./(gsubtract(n\_ones,RandPhiBi));

Thick\_Bi = Thick\_B.\*(exp\_Ratio);

%scatter(Thick\_B,Thick\_Bi)

% histogram(Thick\_Bi)

%PWD caluclation

Rho\_W = linspace(rhoW,rhoW,n);

WD\_a = linspace(WD,WD,n);

Rhodiff\_W = gsubtract(Rho\_W,Rho\_M);

Rhodiff\_A = gsubtract(Rho\_A,Rho\_M);

Rhodiff\_B = gsubtract(Rho\_B,Rho\_M);

Rhodiff\_Bi = gsubtract(Rho\_M,Rho\_Bi);

Rhodiff\_M = gsubtract(Rho\_M,Rho\_W);

Water = WD\_a.\*Rhodiff\_W;

A\_sed = Thick\_A.\*Rhodiff\_A;

B\_sed = Thick\_B.\*Rhodiff\_B;

Bi\_sed = Thick\_Bi.\*Rhodiff\_Bi;

step1 = gadd(Water,A\_sed);

step2 = gadd(step1,B\_sed);

step3 = gadd(step2,Bi\_sed);

PWD = step3./Rhodiff\_W;

M\_Draw = (Draw\_ML-Draw\_LS)/(Draw\_HS-Draw\_LS);

a\_Draw = 3;

b\_Draw = 2-a\_Draw+(a\_Draw/M\_Draw)-(1/M\_Draw);

Drawdown = Draw\_LS+((Draw\_HS-Draw\_LS)\*betarnd(a\_Draw,b\_Draw,1,n));

PWD\_2 = gsubtract(PWD,Drawdown);

%Air-filled calculation

A\_PWD2 = PWD.\*Rhodiff\_M;

B\_PWD2 = PWD\_2.\*Rhodiff\_W;

Air\_filled = (gadd(A\_PWD2,B\_PWD2))./(Rho\_M);

figure (1)

xrange = linspace(WD,2\*WD,n);

histogram(PWD,25)

hold on

yyaxis right

cdfplot(PWD)

xlabel('Paleo-waterdepth (m)')

% xlim([WD,2\*WD])

figure (2)

histogram(PWD\_2,25)

hold on

yyaxis right

cdfplot(PWD\_2)

xlabel('Post Drawdown Paleo-waterdepth (m)')

figure (3)

histogram(Air\_filled,25)

hold on

yyaxis right

cdfplot(Air\_filled)

xlabel('Air-filled depth (m)')

figure (4)

histogram(Rho\_A,25)

xlabel('Density of unit A (kg/m3)')

Ionian Basin post salt:

clc

clear all

%INPUT%

WD = 3360; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS%

%Top of unit B, HS, ML, LS

TopB\_ML = 3720; % Most likely top B

TopB\_HS = 3740; % High estimate top B

TopB\_LS = 3700; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.65;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2670; %dry grain density (ML)

rhoA\_HS = 2700; %dry grain density (HS)

rhoA\_LS = 2660; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700+2225; % Most likely top B

BasB\_HS = TopB\_HS+2000+2250; % High estimate top B

BasB\_LS = TopB\_LS+1500+2200; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.28;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2400; %dry grain density (ML)

rhoB\_HS = 2450; %dry grain density (HS)

rhoB\_LS = 2380; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Gulf of Lions

clc

clear all

%INPUT%

WD = 2400; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS%

%Top of unit B, HS, ML, LS

TopB\_ML = 4910; % Most likely top B

TopB\_HS = 5300; % High estimate top B

TopB\_LS = 4800; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.27;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2400; %dry grain density (ML)

rhoA\_HS = 2450; %dry grain density (HS)

rhoA\_LS = 2350; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700; % Most likely top B

BasB\_HS = TopB\_HS+2000; % High estimate top B

BasB\_LS = TopB\_LS+1500; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.5;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2670; %dry grain density (ML)

rhoB\_HS = 2710; %dry grain density (HS)

rhoB\_LS = 2650; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Drawdown values

Draw\_ML = 1650; %Drawdown values

Draw\_HS = 2000;

Draw\_LS = 1400;

Gulf of Lions post salt

clc

clear all

%INPUT%

WD = 2400; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS%

%Top of unit B, HS, ML, LS

TopB\_ML = 4000; % Most likely top B

TopB\_HS = 4100; % High estimate top B

TopB\_LS = 3900; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.65;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2670; %dry grain density (ML)

rhoA\_HS = 2700; %dry grain density (HS)

rhoA\_LS = 2660; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700+910; % Most likely top B

BasB\_HS = TopB\_HS+2000+1000; % High estimate top B

BasB\_LS = TopB\_LS+1500+890; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.37;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2450; %dry grain density (ML)

rhoB\_HS = 2500; %dry grain density (HS)

rhoB\_LS = 2420; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Herodotous basin

clc

clear all

%INPUT%

WD = 2425; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS%

%Top of unit B, HS, ML, LS

TopB\_ML = 6385; % Most likely top B

TopB\_HS = 6500; % High estimate top B

TopB\_LS = 6300; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.30;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2400; %dry grain density (ML)

rhoA\_HS = 2450; %dry grain density (HS)

rhoA\_LS = 2350; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700; % Most likely top B

BasB\_HS = TopB\_HS+2000; % High estimate top B

BasB\_LS = TopB\_LS+1500; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.5;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2670; %dry grain density (ML)

rhoB\_HS = 2710; %dry grain density (HS)

rhoB\_LS = 2650; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Drawdown values

Draw\_ML = 1650; %Drawdown values

Draw\_HS = 2000;

Draw\_LS = 1400;

Herodotus basin post salt

clc

clear all

%INPUT%

WD = 2425; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS%

%Top of unit B, HS, ML, LS

TopB\_ML = 3635; % Most likely top B

TopB\_HS = 3700; % High estimate top B

TopB\_LS = 3600; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.65;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2670; %dry grain density (ML)

rhoA\_HS = 2700; %dry grain density (HS)

rhoA\_LS = 2660; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700+2750; % Most likely top B

BasB\_HS = TopB\_HS+2000+2800; % High estimate top B

BasB\_LS = TopB\_LS+1500+2725; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.2;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2340; %dry grain density (ML)

rhoB\_HS = 2400; %dry grain density (HS)

rhoB\_LS = 2300; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Levantine basin presalt

%INPUT%

WD = 2030; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS%

%Top of unit B, HS, ML, LS

TopB\_ML = 4150; % Most likely top B

TopB\_HS = 4250; % High estimate top B

TopB\_LS = 4100; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.04;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2210; %dry grain density (ML)

rhoA\_HS = 2250; %dry grain density (HS)

rhoA\_LS = 2200; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700; % Most likely top B

BasB\_HS = TopB\_HS+2000; % High estimate top B

BasB\_LS = TopB\_LS+1500; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.5;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2670; %dry grain density (ML)

rhoB\_HS = 2710; %dry grain density (HS)

rhoB\_LS = 2650; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Drawdown values

Draw\_ML = 1650; %Drawdown values

Draw\_HS = 2000;

Draw\_LS = 1400;

Levantine basin post-salt

clc

clear all

%INPUT%

WD = 2030; % Present day water depth (m) - Also top of Unit A

rhoW = 1030; % water density, kg/m3

rhoM\_ML = 3250; %mantle density (ML), kg/m3

rhoM\_HS = 3300; %mantle density (HS), kg/m3

rhoM\_LS = 3200; %mantle density (LS), kg/m3

Kurt\_rhoM = 1;%Kurtosis for mantle density: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

Trial = 5000; % Random trian number

%UNIT A PARAMETERS%

%Top of unit B, HS, ML, LS

TopB\_ML = 2450; % Most likely top B

TopB\_HS = 2480; % High estimate top B

TopB\_LS = 2440; % Low estimate top B

Kurt\_TB = 0.5; %Kurtosis for top B: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit A athys coefficeints, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

Phi0A = 0.65;

C\_unA\_ML = 0.6;

C\_unA\_HS = 0.55;%This should be a smaller number than ML

C\_unA\_LS = 0.62; %This should be a bigger number than ML

%Unit A grain density

rhoA\_ML = 2670; %dry grain density (ML)

rhoA\_HS = 2700; %dry grain density (HS)

rhoA\_LS = 2660; %dry grain density (LS)

Kurt\_rhoA = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%UNIT B PARAMETERS%

%Base of unit B, HS, ML, LS: silt ~0.6, shale ~0.68, sand ~0.3, carbonate ~0.25, challk ~0.72

BasB\_ML = TopB\_ML+1700+1700; % Most likely top B

BasB\_HS = TopB\_HS+2000+1800; % High estimate top B

BasB\_LS = TopB\_LS+1500+1650; % Low estimate top B

Kurt\_BB = 1; %Kurtosis for base B:1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic

%Unit B athys coefficeints, HS, ML, LS

Phi0B = 0.3;

C\_unB\_ML = 0.68;

C\_unB\_HS = 0.65;

C\_unB\_LS = 0.70;

%Unit B grain density (Kg/m3)

rhoB\_ML = 2440; %dry grain density (ML)

rhoB\_HS = 2500; %dry grain density (HS)

rhoB\_LS = 2400; %dry grain density (LS)

Kurt\_rhoB = 1;%Kurtosis for grain density for unit A: 1 = mesokurtic, 0.5 = platykurtic, 2 = Leptokurtic