
Figure 4a-c Script

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PLOTTING FREQUENCY HSI VALUES AGAINST ELEVATION,ASPECT & SLOPE AGAINST LATITUDINAL CHANGE

I: Loading the data

REMINDER:Must change the number for each tiff (27 Tiff total).

```
% Frequency
HSIa = geotiffread('freq1.tif');HSIa(HSIa<0)=NaN;HSIa=double(HSIa);
% Elevation
Elev = geotiffread('dem1.tif');Elev(Elev<0)=NaN;Elev=double(Elev);
% Aspect
Asp = geotiffread('aspect1.tif');Asp(Asp<0)=NaN;Asp=double(Asp);
% Slope
slope=geotiffread('slope1.tif');slope(slope<0)=NaN;slope=double(slope);
Asp(slope>=10);
%figure;imagesc(HSI,clims);colormap(jet);colorbar;
%figure;imagesc(HSI_cv,clims);colormap(jet);colorbar;
```

II: Performing the operations

Calculating bin means

```
[x,y] = size(Elev);
BM = [];AM = []; X=[];Y=[];Z=[];AX=[];AY=[];AZ=[];tic
% number of rows in matrix (1st 3-digits)grado=###
grado = 692;
% last digit in number of rows x-#
for i = 1:grado:x-6
    % the sub-matrix where the means of the elevation bins for each
    degree will be calculated
    sub_m = HSIa(i:(i+grado)-1,:);
    sub_e = Elev(i:(i+grado)-1,:);
    sub_a = Asp(i:(i+grado)-1,:);

    % Performing the calculations for Elevation(Range: 100-7000
    m.a.s.l)
    % finding the bin means
    Bm = [];
    for j = 100:100:7000
```

```

        bin = find(sub_e<=j & sub_e>=j-99);
        m_hsi = nanmean(sub_m(bin));
        bm = [i j m_hsi];
        Bm = [Bm; bm];
    end

    BM=[BM Bm];
    X = [X Bm(:,1)];
    Y = [Y Bm(:,2)];
    Z = [Z Bm(:,3)];

    % Performing the calculations for Aspect
    Am = [];
    for j = 22.5:22.5:360
        abin = find(sub_a<=j & sub_a>=j-22.5);
        am_hsi = nanmean(sub_m(abin));
        am = [i j am_hsi];
        Am = [Am; am];
    end
    AM=[AM Am];
    AX = [AX Am(:,1)];
    AY = [AY Am(:,2)];
    AZ = [AZ Am(:,3)];

end
% Normalizing range:"frequencyHSi>7=7" & "frequencyHSi<0=0"
ind = find(Z>7);
a_ind = find(AZ>7);
Z(ind) = 7;
AZ(a_ind) = 7;
ind = find(Z<0);
a_ind = find(AZ<0);
Z(ind) = 0;
AZ(a_ind) = 0;
% figure;contourf(X,Y,Z);colormap(jet);
% figure;contourf(AX,AY,AZ);colormap(jet);
% REMINDER:Must change the number for each tiff.
X1= X; AX1= AX;
Y1= Y; AY1= AY;
Z1= Z; AZ1= AZ;
toc

```

III: Generating the arrays

Run after Step II is done % Generating the elevation y-axis array

```

for i = 1:1:70
    XC(i,:) = 1:1:270;
end
%
% % Concatenating the Y and Z matrices on the 2 dimension
YC = cat(2, Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8, Y9, Y10, Y11, Y12, Y13, ...
, Y14, Y15, Y16, Y17, Y18, Y19, Y20, Y21, Y22, Y23, Y24, Y25, Y26, Y27);

```

```

ZC = cat(2,Z1,Z2,Z3,Z4,Z5,Z6,Z7,Z8,Z9,Z10,Z11,Z12,Z13,...
        Z14,Z15,Z16,Z17,Z18,Z19,Z20,Z21,Z22,Z23,Z24,Z25,Z26,Z27);
%
% Generating the aspect array
for i = 1:1:16
    AXC(i,:) = 1:1:270;
end
%
AYC =
    cat(2,AY1,AY2,AY3,AY4,AY5,AY6,AY7,AY8,AY9,AY10,AY11,AY12,AY13,...
        AY14,AY15,AY16,AY17,AY18,AY19,AY20,AY21,AY22,AY23,AY24,AY25,AY26,AY27);
AZC =
    cat(2,AZ1,AZ2,AZ3 ,AZ4,AZ5,AZ6,AZ7,AZ8,AZ9,AZ10,AZ11,AZ12,AZ13,...
        AZ14,AZ15,AZ16,AZ17,AZ18,AZ19,AZ20,AZ21,AZ22,AZ23,AZ24,AZ25,AZ26,AZ27);
%

```

IV: Creating final figures

Run after Step III is done

```

figure;contourf(AYC,AXC,AZC,'LineStyle','none');colormap(jet)
figure;contourf(YC,XC,ZC,'LineStyle','none');colormap(jet)

```

Modification for creating slope plot

Substitute the following in Aspect

```

% Modification slope 1: Loading data

Asp = geotiffread('slope1.tif');Asp(Asp<0)=NaN;Asp=double(Asp);

% Modification slope 2: Performing operations

    for j = 0:1:90
        abin = find(sub_a<=j & sub_a>j-1);
        am_hsi = nanmean(sub_m(abin));
        am = [i j am_hsi];
        Am = [Am; am];
    end

% Modification slope 3: Generating the arrays

for i = 1:1:91
    AXC(i,:) = 1:1:270;
end

```

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