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Supplement of

Constant flux layers with gravitational settling: links to aerosols, fog and deposition velocities

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Supplementary Material - CFLGS

These are Matlab codes to generate Figures 1a, 2a, and 4. Figures generated and shown here had captions added and fonts changed later. Fig 1b and Fig 3 should be simple code changes.

Figure 1a

```
%CFLWGSFig1a
figure
z0c = 0.01; ztop=50;
N=101; dz=ztop/(N-1);
z=(0:dz:ztop);
zeta = log((z+z0c)/z0c);
zetatop = log((ztop+z0c)/z0c);
S = ([0 0.1 0.2 0.3]);
QW=zeros(4,101);
QW(1,:) = zeta(:)/zeta(N);
plot(QW(1,:)/QW(1,N),z,'LineWidth',1.5);
hold on
for i = 2:4 %Calculations normalised by Qc*/k
   QW(i,:) = (1-exp(-S(i)*zeta(:)))/S(i);
   plot(QW(i,:)/QW(i,N),z,'LineWidth',1.5);
   hold on
end
xlabel('Qc/Qc(50)');ylabel('z(m)');
ylim([0 50]);
xlim([0 1]);
```

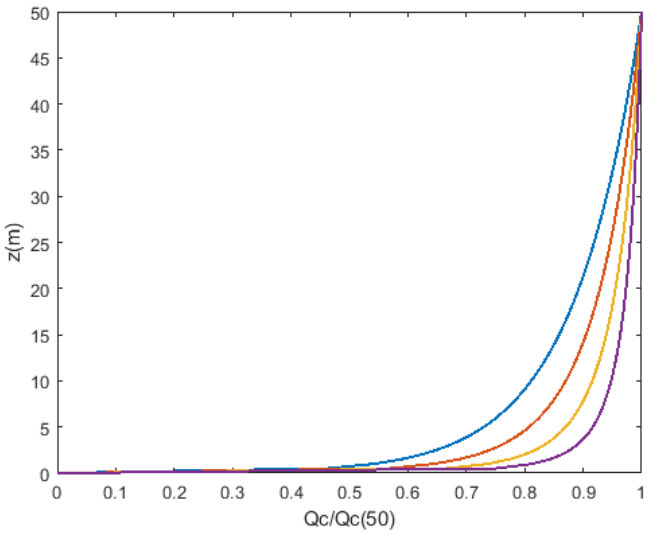
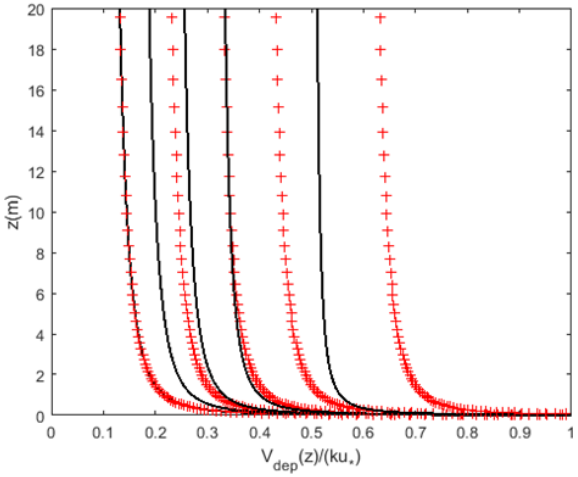


Figure 2a

```
%CFLWGS - Fig 2a
figure
newcolors = {'black','red'};
colororder(newcolors)%
z0c = 0.01; z0m = 0.01; ztop=50; %vk = 0.4; us=1; %nominal u*
zetatop = log((ztop+z0c)/z0c); zetamtop = log((ztop+z0m)/z0m);
N=101; dzeta=zetatop/(N-1); %could improve resolution with increased N
zeta = 0:dzeta:zetatop;
z=(exp(zeta)-1)*z0c; Ra = log((z + z0m)/z0m);
Rs = log(z0m/z0c);%/(vk*us);
S0=0;S = ([0.1 0.2 0.3 0.5]); %for 4 cases
QW=zeros(4,101);
plot(1./zeta,z,'LineWidth',1.5);hold on;
plot(1./(Ra + Rs),z,'+');hold on;
for i = 1:4
   QW(i,:) = (1-exp(-S(i).*zeta(:)))/S(i);
   QWI(i,:) = 1./QW(i,:);
   SPZ(i,:) = S(i)+1./(Ra(1,:)+Rs);
   VD2(i,:) = S(i)./(1-exp(-S(i).*(Ra(1,:)+Rs)));
   plot(QWI(i,:),z,'LineWidth',1.5);
   hold on
   plot(SPZ(i,:),z,'+')
   hold on
```



```
end
xlabel('V_d_e_p(z)/(ku_*)');ylabel('z(m)');
ylim([0 20]); xlim([0 1]);
% Fonts and axis labels can be adjusted later
```

Figure 4

```
%CFLWSFig4
figure
z0c=0.01; beta=5; L = 20; %For near-neutral case use larger L
zmin=0; vk=0.4;%Could vary ztop and N
ztop=20;N=201; dz=ztop/(N-1);
zetatop = log((ztop+z0c)/z0c);
z=(0:dz:ztop);
zeta = log((z+z0c)./z0c);
x = beta.*(z+z0c)./L; x0 = beta*z0c/L;
%zeta = 0:dzeta:zetatop; % if using log height axis
%z=(exp(zeta)-1)*z0c;
S = ([0.01 0.1 0.2 0.4]);
Qcf=zeros(4,201);
%plot(zeta/zetatop,z);hold on;
for i = 1:4
    Fx=(x.^S(i).*exp(S(i).*x))./S(i);
    Fx0 = (x0.^S(i).*exp(S(i)*x0))./S(i);
    Qcf(i,:) = (x.^-S(i).*exp(-S(i)*x)).*(Fx-Fx0);
    plot(Qcf(i,:)/Qcf(i,N),z,'LineWidth',1.5);
    hold on
end
xlabel('Qc/Qc(Ztop)');
ylabel('z(m)');
ylim([0 ztop]);xlim([0 1]);
QCratS0 = (zeta+beta.*z./L)/(zeta(N)+beta*z(N)/L);
plot(QCratS0,z,'+'); %S = 0 case
```