% Script for plotting 22 rivers tracers on one image using multiple hues. Opendap paths are

% specific to eReefs hydrodynamics 2.0 for both 1 km (GBR1\_H2p0) and 4 km (GBR4\_H2p0).

%

% Mark Baird 14 June 2019.

%

% Only plots the dominant river tracer.

% Uses gauaged flows divided by guaged flow fraction from 1986-2018 SOURCE Catchmnents.

%

% Accessing near-surface concentration of tracers at midday.

%

% If using, please acknowledge eReefs Project following below reference:

%

% Reference: Baird, M. E., J. Andrewartha, M. Herzfeld, E. Jones, N. Margvelashvili, M. Mongin, F. Rizwi, J. Skerratt, M. Soja-Wozniak, K. Wild-Allen, T. Schroeder, B. Robson, E. da Silva, M. Devlin (2017) River plumes of the Great Barrier Reef: freshwater, sediment and optical footprints quantified by the eReefs modelling system. In Syme, G., Hatton MacDonald, D., Fulton, B. and Piantadosi, J. (eds) MODSIM2017, 22nd International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, December 2017, pp.1892-1898. ISBN: 978-0-9872143-7-9. https://www.mssanz.org.au/modsim2017/L22/baird.pdf.

close all

clear all

load /home/mgproja/gbr/coast/gbr.cst

ccc = [0.2771 0.2790 0.2375

 0.8296 0.3390 0.3900

 0.5669 0.2101 0.7274 % pine

 0.9345 0.5102 0.9175

 0.6 0.6 0

 0.5 0.5 0.5

 0 0.6 0 % cal

 0.4898 0.3909 0.9360 % boyne

 0.6932 0.4546 0.1248

 0.5 0.5 0.5 % pio

 0.0991 0.4317 0.6465

 0.0442 0.6676 0.5532

 0.5573 0.8116 0.3983 % burd

 0.7725 0.4857 0.7498

 0.3119 0.6644 0.5552

 0.5771 0.5901 0.1375 %tully

 0.8296 0.3390 0.3900

 0.4898 0.3909 0.9360 % mul

 0.1 0.6 0.1 % barron

 1 0.5 0.5

 0.5 0.5 0.5

 0.5573 0.8116 0.3983 %fly

];

ccc1 = ccc\*1.5;

ccc1(ccc1>1) = 1;

ccc = [ccc;ccc1];

% gbr4:

%filepath = 'http://cmar-02-mel.it.csiro.au:8080/opendap/cache/gbr4/hydro/2.0/rivers/';

%file = [filepath 'gbr4\_rivers\_surf\_2017-01.nc'];

%config = 'gbr4';del\_time\_ind = 1;outputname = 'GBR4';

% gbr1:

filepath = 'http://cmar-02-mel.it.csiro.au:8080/opendap/cache/gbr1/hydro/2.0/rivers/';

file = [filepath 'gbr1\_rivers\_surf\_2014-12.nc'];

config = 'gbr1';del\_time\_ind = 1;outputname = 'GBR1';

Rivers = {'log','bri','pin','cab','mar','bnt','cal','boy','fit','pio','con','don','bur','hau','her','tul','jon','mul','bar','dai','nom','fly'};

% unguaged fraction of the catchments.

Rfact = [1,1,1,1,2356999/2892034,974898/1075577,160921/411536,252229/315872,5271686/6018377,880375/1011687,415687/1774187,447095/993188,1,624709/1216102,3493961/5081487,2943154/3500823,2741842/4821472,2233830/4243234,681304/853606,1419316/2886949,1935101/3706839,1];

Rivers1 = {'Logan','Brisbane','Pine','Caboolture','Mary','Burnett','Calliope','Boyne','Fitzroy','Pioneer','OConnell','Don','Burdekin','Haughton','Herbert','Tully','Johnstone','Mulgrave','Barron','Daintree','Normanby','Fly'};

xx = ncread(file,'x\_centre');

yy = ncread(file,'y\_centre');

x\_grid = ncread(file,'x\_grid');

y\_grid = ncread(file,'y\_grid');

[M,N] = size(x\_grid);

tmp = zeros(M,N);

A = zeros(size(xx,1),size(xx,2))\*NaN;

T = zeros(size(xx,1),size(xx,2),size(Rivers,2));

for yyyy = 2015:2019

start = datenum(yyyy,1,1);

finish = datenum(yyyy,12,31);

if yyyy == 2019

 finish = datenum(yyyy,6,30);

end

time = [];

count = 1;

set(gcf','Renderer','painters')

figure('Position',[520 478 760 620]);

for tt = start:finish

 eval(['file = ''',filepath,config,'\_rivers\_simple\_',datestr(tt,'yyyy'),'-',datestr(tt,'mm'),'.nc''']);

 dd = tt - datenum([datestr(tt,'yyyy'),',',datestr(tt,'mm'),',','1'])+1;

 if (strcmp(config,'gbr4') & strcmp(datestr(tt,'yyyy'),'2017') & strcmp(datestr(tt,'mm'),'09'))

 if str2num(datestr(tt,'dd')) < 8

 file = [filepath,'gbr4\_rivers\_simple\_2017-09-0.nc'];

 else

 file = [filepath,'gbr4\_rivers\_simple\_2017-09.nc'];

 dd = dd - 6;

 end

 end

 time = ncread(file,'time',dd,1,1)+datenum(1990,1,1);

 for rr = 1:size(Rivers,2)

 char(Rivers(rr))

 if config == 'gbr4'

 T(:,:,rr) = squeeze(ncread(file,char(Rivers(rr)),[1 1 44 dd],[inf inf 1 1],[1 1 1 1]))./Rfact(rr);

 else

 T(:,:,rr) = squeeze(ncread(file,char(Rivers(rr)),[1 1 41 dd],[inf inf 1 1],[1 1 1 1]))./Rfact(rr);

 end

 end

 disp(datestr(time));

 for ii = 1:size(T,1)

 for jj = 1:size(T,2)

 if isfinite(T(ii,jj,:))

 tmp = find(T(ii,jj,:) == max(T(ii,jj,:)));

 if length(tmp) == 1 & T(ii,jj,tmp) > 0.1 & T(ii,jj,tmp) < 10.0

 A(ii,jj) = tmp;

 elseif length(tmp) == 1 & T(ii,jj,tmp) > 0.01 & T(ii,jj,tmp) < 10.0

 A(ii,jj) = tmp+22;

 else

 A(ii,jj) = NaN;

 end

 end

 end

 end

tmpA = zeros(M,N);

clf

clim = [0.5 44.5];

tmpA(1:M-1,1:N-1) = squeeze(A(:,:));

set(gcf,'Position',[520 478 760 620])

h = axes('Position',[0.40 0.05 0.50 0.9]); % Southern QLD

pcolor(x\_grid,y\_grid,tmpA);

cc = colorbar;pos = get(cc,'Position');

hpos = get(gca,'Position');

set(cc,'Position',pos+[-0.01 -0.03 0 0]);

set(gca,'Position',hpos);

shading flat;

set(gca,'clim',clim);

colormap(ccc);

set(cc,'YTick',[1:22]);

set(cc,'YTicklabel',char(Rivers1),'FontSize',8);

title(datestr(time));

set(get(gca,'title'),'Interpreter','None','FontWeight','bold','FontSize',12)

hold on

plot(gbr(:,1),gbr(:,2),'k')

set(gca,'ylim',[-26 -19],'xlim',[145 153.5]);

text(149.9,-23.7,'Fitzroy','FontSize',8);

text(150,-24.0,'Cal./Boy.','FontSize',8);

text(150.5,-24.7,'Burnett','FontSize',8);

text(151.8,-25.5,'Mary','FontSize',8);

text(147.7,-21,'Pioneer','FontSize',8);

text(147.2,-20.6,'O''Connell','FontSize',8);

text(147.6,-20.1,'Don','FontSize',8)

text(146.3,-19.8,'Burdekin','FontSize',8)

text(146.2,-19.55,'Haughton','FontSize',8)

h = axes('Position',[0.05 0.05 0.29 0.9]); % Northern QLD

pcolor(x\_grid,y\_grid,tmpA);

shading flat;set(gca,'clim',clim);

if config == 'gbr4'

ttt = title(['eReefs 4 km model (GBR4\_H2p0)']);

 else

ttt = title(['eReefs 1 km model (GBR1\_H2p0)']);

end

set(ttt,'FontWeight','bold','FontSize',14);

set(get(gca,'title'),'Interpreter','None','FontWeight','bold','FontSize',14)

hold on

plot(gbr(:,1),gbr(:,2),'k')

set(gca,'ylim',[-20 -13],'xlim',[[143 148]]);

text(146.3,-19.8,'Burdekin','FontSize',8)

text(143.3,-14.7,'Normanby','FontSize',8)

text(146.2,-19.55,'Haughton','FontSize',8)

text(145.23,-16.8,'Daintree','FontSize',8,'Rotation',90);

h = axes('Position',[0.41 0.06 0.20 0.35]) % Moreton Bay

pcolor(x\_grid,y\_grid,tmpA);

shading flat;set(gca,'clim',clim);

hold on

plot(gbr(:,1),gbr(:,2),'k');set(gca,'Xticklabel','','Yticklabel','');

set(gca,'ylim',[-28 -26],'xlim',[[152.8 153.8]]);

text(152.85,-27.63,'Brisbane','FontSize',8);

text(153.1,-27.85,'Logan','FontSize',8);

text(152.85,-27.25,'Pine','FontSize',8);

text(152.90,-27.1,'Cab','FontSize',8);

h = axes('Position',[0.41 0.42 0.155 0.25]) % WhitSundays

pcolor(x\_grid,y\_grid,tmpA);

shading flat;set(gca,'clim',clim);

hold on

plot(gbr(:,1),gbr(:,2),'k');set(gca,'Xticklabel','','Yticklabel','');

set(gca,'ylim',[-21.5 -19.5],'xlim',[[148 150]]);

%text(148.1,-21.2,'Whit-','FontSize',8);text(148.1,-21.4,'sundays','FontSize',8);

%text(148.1,-21.3,'Whitsundays','FontSize',8)

text(148.3,-21.05,'Pioneer','FontSize',8);

text(148.1,-20.6,'O''Con.','FontSize',8);

h = axes('Position',[0.06 0.06 0.15 0.30]) % Hinchinbrook

pcolor(x\_grid,y\_grid,tmpA);

shading flat;set(gca,'clim',clim);

hold on

plot(gbr(:,1),gbr(:,2),'k');set(gca,'Xticklabel','','Yticklabel','');

set(gca,'ylim',[-18.7 -17.7],'xlim',[[145.8 146.8]]);

text(145.82,-18.6,'Herbert','FontSize',8);

text(145.88,-18.1,'Tully','FontSize',8,'Rotation',90);

h = axes('Position',[0.06 0.37 0.10 0.255]) % Barron

pcolor(x\_grid,y\_grid,tmpA);

shading flat;set(gca,'clim',clim);

hold on

plot(gbr(:,1),gbr(:,2),'k');set(gca,'Xticklabel','','Yticklabel','');

set(gca,'ylim',[-17.1 -15.9],'xlim',[[145.1 146.1]]);

set(gca,'ylim',[-17.1 -15.9]-0.7,'xlim',[[145.25 146.25]]);

text(145.3,-17.0,'Barron','FontSize',8);

text(145.3,-17.2,'Mulgrave','FontSize',8);

text(145.35,-17.5,'Johnstone','FontSize',8);

cc1 = colorbar;

set(cc1,'Position',pos+[0.10 -0.03 0 0]);

set(cc1,'Ylim',[22.5 44.5],'Yticklabel','');set(cc,'Ylim',[.5 22.5]);

set(get(cc,'title'),'String','>10%');

set(get(cc1,'title'),'String','>1%');

h = axes('Position',[0.23 0.72 0.2 0.2]) % PNG

pcolor(x\_grid,y\_grid,tmpA);shading flat;

set(gca,'clim',clim);

set(get(gca,'title'),'Interpreter','None')

text(141,-7,'Fly River','FontSize',8);

set(gca,'Xticklabel','','Yticklabel','');

hold on

load worldcoast.dat

plot(worldcoast(:,1),worldcoast(:,2),'k')

set(gca,'ylim',[-15 -5],'xlim',[[140 150]]);

tmpp = datestr(ncread(file,'time',dd,1,1),'ddmmyy');

%[520 478 760 620]

im = frame2im(getframe(gcf));

[imind,cm] = rgb2ind(im,256);

if count == 1

 imwrite(imind,cm,[outputname,'\_H2p0\_rivers\_',num2str(yyyy),'.gif']);

else

 imwrite(imind,cm,[outputname,'\_H2p0\_rivers\_',num2str(yyyy),'.gif'],'Writemode','Append','DelayTime',0.2);

end

count = count+1;

end

end