% 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