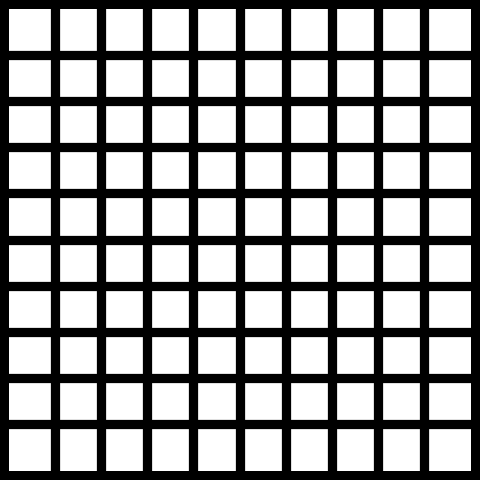
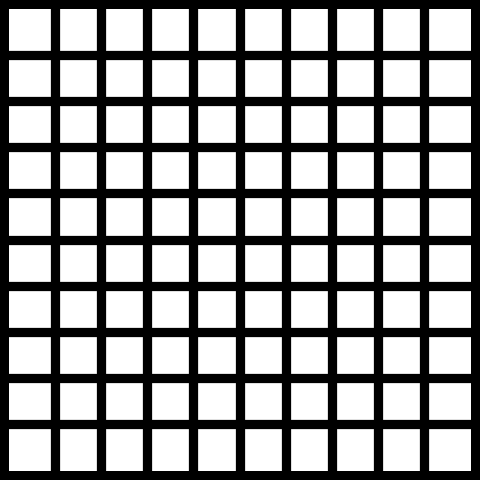
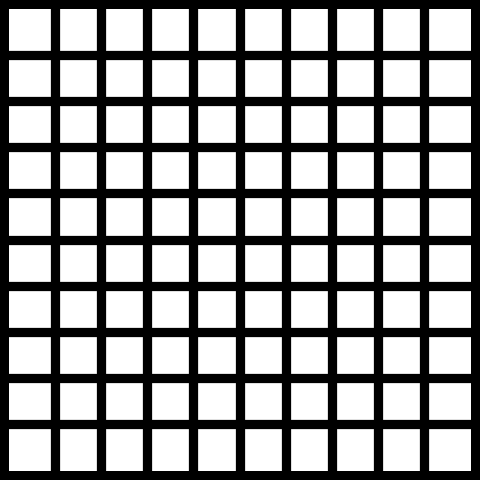
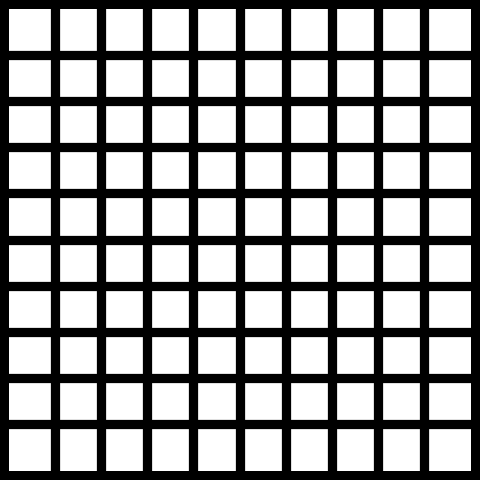
Change in Volumetric Flow of SODA Domain: all lon, all depth -1<=lat<=1

Title indicates change in Sverdrup per century; positive values indicate eastward flow

How I (think) I calculated this:

Generated a grid of depth x lat area and multiplied it by eastward velocity (u) for all longitudes at all times. I then summed volume flux (m3/s) over latitude (-1<lat<1) all depth and all longitude and converted to Sverdrups.



depth

lat

lon

% EUC SODA analysis

close all

ncid = netcdf.open ('u\_eqpac\_SODA\_extended.nc','NC\_NOWRITE');

% get variable ID

varid\_lat = netcdf.inqVarID(ncid,'lat');

varid\_lon = netcdf.inqVarID(ncid,'lon');

varid\_time = netcdf.inqVarID(ncid,'time');

varid\_u = netcdf.inqVarID(ncid,'u');

varid\_depth = netcdf.inqVarID(ncid,'depth');

% get variables

time = netcdf.getVar(ncid,varid\_time);

lat = netcdf.getVar(ncid,varid\_lat);

lon = netcdf.getVar(ncid,varid\_lon);

u = netcdf.getVar(ncid,varid\_u);

depth = netcdf.getVar(ncid,varid\_depth);

% lon x lat x depth x time

% eliminate missing value fill value (-9.99e+33)

u(u<-10) = NaN;

%% Determining EUC Current Flux Across -1<=Lat<=1

close all

% calculating area of grid box:

% depth dimension

I\_lat = find(lat<=1 & lat>=-1);

depth\_int = diff([0;depth]);

height = zeros(length(depth),1);

for j = 2:length(depth)

height(j-1) = 0.5\*(depth\_int(j) + depth\_int(j-1));

end

height(1) = height(1)+ 0.5\*depth\_int(1);

height(end) = depth\_int(end);

% latitudinal dimension: always about 0.5 degrees apart, assume 110.574 km

% per degree lat

% ASSUMPTION: distant between latitudes is constant - not actually true

y\_dim = 0.5\*110.574\*100; %in meters

% calculate grid of areas (square meters)

grid\_area\_1 = repmat(height\*y\_dim,1,numel(find(I\_lat)));

grid\_area\_2 = repmat(grid\_area\_1,[1 1 length(lon)]);

grid\_area\_3 = permute(grid\_area\_2,[3 2 1]);

grid\_area\_4 = repmat(grid\_area\_3,[1 1 1 length(time)]);

% apply to all SODA velocities between -1<=Lat<=1

flux\_1 = grid\_area\_4.\* u(:,(lat<=1 &lat>=-1),:,:);

% looking at net transport in domain -1<=Lat<=1

domain\_flux = squeeze(squeeze(squeeze(nansum(nansum(nansum(flux\_1))))));

% only interested in integrating positive values

time\_2 = zeros(1,length(time));

timen = time-.5;

for j = 1:length(time)

time\_2(j) = addtodate(datenum(1960,1,1),double(timen(j)),'month');

end

titles = {'monthly data','1-yr mean','7-yr mean','10-yr mean'};

win\_i = [0,1,7,10]; % number of years in running mean

for j = 1:4

% get running mean

win = win\_i(j)\*12+1;

avg\_flux = runmean(domain\_flux,win)/(10^6);timeser = avg\_flux;

% calculate trend

trend= timeser((1+floor(win/2)):(end-floor(win/2)))-detrend(timeser((1+floor(win/2)):(end-floor(win/2))));

subplot(2,2,j)

% plot data or running mean

plot(time\_2,avg\_flux)

hold on

% plot trendline

plot(time\_2((1+floor(win/2)):(end-floor(win/2))),trend,'-.r','LineWidth',2)

%plot details

legend(char(titles(j)),'Location', 'northwest')

title((trend(2)-trend(1))\*12\*100); % this calculates the trend per century if the data are daily

datetick('x','yyyy','keeplimits')

end