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% read data from NREL tower, edited by SKK

% missing data = NaN (all wind data is missing if any is missing)

clear all

load 1997_hourly_wspd wspd_hr

% wspd_hr      8760x7             490560  double

% HOUR-MST,
% Avg Avg Wind Speed @ 2m [m/s],
% Avg Avg Wind Speed @ 5m [m/s],
% Avg Avg Wind Speed @ 10m [m/s],
% Avg Avg Wind Speed @ 20m [m/s],
% Avg Avg Wind Speed @ 50m [m/s],
% Avg Avg Wind Speed @ 80m [m/s]

miss = isnan(wspd_hr(:,2));

total_missing = sum(miss);
disp(['Total missing = ' num2str(total_missing,3)])

% annual average wind speed and standard deviation

avg = mean(wspd_hr(~miss,2:7));
std_dev = std(wspd_hr(~miss,2:7));

disp(' ')
disp(['Average wind speed = ' num2str(avg,3)])
disp(['Std dev of wind speed = ' num2str(std_dev,3)])

% averages for hour of day

% subset by seasons (they overlap slightly so there are 92 days in each)

djf = [1:61 335:365];
mam = 60:151;
jja = 152:243;
son = [244:335];

mm = zeros(4,92);
mm(1,:)=djf;
mm(2,:)=mam;
mm(3,:)=jja;
mm(4,:)=son;

season = {'DJF' 'MAM' 'JJA' 'SON'};

for k=1:4

% process one level at a time

for i = 2:7

wspd_hr_day_all(2:25,:) = reshape(wspd_hr(:,i), 24, 365);
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wspd_hr_day_all(1,:) = wspd_hr_day_all(25,:);

wspd_hr_day = wspd_hr_day_all(:,mm(k,:));

% average over days (second dimension)

% skip missing data
for j = 1:25
    mhour = isnan(wspd_hr_day(j,:));
    wspd_hr_day_avg(j) = mean(wspd_hr_day(j,~mhour),2);
end

sum(isnan(wspd_hr_day_avg));

% plot

    hours = 0:24;

    if k==3
       kk=4;
    elseif k==4
       kk=3;
    else
        kk = k;
    end

    subplot(2,2,kk)

    plot(hours,wspd_hr_day_avg)
    grid on

    axis([0 24 0 6])
    set(gca,'XTick',0:6:24)   % specify tick marks
    xlabel('Hour of Day')
    ylabel('Wind Speed (m/s)')
    title(season{k})

    hold on

end

hold off

end

orient landscape
print -dpsc2 wind_speed_hour_season_height.ps
```