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%=====
% Simplified driver for GPS Visibility Codes
%
% Based on GPSVisibility_GUI by Ben K. Bradley and calling functions used
% in that GUI.
% P. Axelrad 9/12
%

%=====
%=====

clear, close all

% Enter the time of interest
% UTC = [2014 9 27 19 0 0];
UTC = [2014 9 28 18 56 4];
% UTC = [2014 9 20 19 0 0];
GPSvec = utc2gpsvec(UTC); % This will adjust for leap second offset
[WN2, TOW, WN1] = gpsvec2gpstow(GPSvec) ; %WN1 is full week, WN2 is mod1024
check = gpstow2gpsvec(WN2,TOW,2); % See if it converts back correctly, 2 for WN2

% Construct YUMA almanac file name since this is default setting
navfilename = generate_GPSyuma_name(GPSvec);
[navfilename,statusflag] = download_GPSyuma(GPSvec);

% Grab duration and time step =====
durationhrs = 24;

dt_sec = 600;

% Input Antenna Location =====
% latgd = 39+38/60+07.340/3600;%90.0; % latitude, deg
% lon   = -105+05/60+47.552/3600;%-105.0; % longitude, deg
latgd = 40; % latitude, deg
lon    = -105; % longitude, deg
alt    = 1600.0; % altitude, m

% Make antenna pointed straight up
ant_enu = [0 0 1];

% Set minimum and maximum mask angles
mask_min = 10; % deg
mask_max = 90; % deg

[time_wntow,GPSdata] = ASEN5090_GPSvis(navfilename, 1, GPSvec,...
    durationhrs, dt_sec, latgd, lon, alt,...
    mask_min, mask_max, mask_min, ant_enu, 0, []);
hrofweek = time_wntow(:,2)/3600;

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% Plot results =====
% =====

% Number of Satellites Visible -----
[ax2] = plot_GPSnumsats(hrofweek, GPSdata.ant_numsats);

title(ax2, 'Number of visible satellites')

% Topocentric: AzEl Plot -----
[rows,cols] = size(GPSdata.topo_el);

az_vec      = reshape(GPSdata.topo_az,rows*cols,1);
el_vec      = reshape(GPSdata.topo_el,rows*cols,1);
GPSdata.prn = repmat([1:32],rows,1);

% plot the sats visible to antenna only%fig3 = figure; ax3 = axes;
figure
% plotAzEl(GPSdata.topo_az',GPSdata.topo_el',GPSdata.prn')
plotAzEl(GPSdata.topo_az(1,:)',GPSdata.topo_el(1,:)',GPSdata.prn(1,:))

% Antenna-centric: Elevation Plot -----

time_mat = repmat(hrofweek,1,cols);
time_vec = reshape(time_mat,rows*cols,1);

fig4 = figure; ax4 = axes;
plot(ax4,time_vec,el_vec,'ob','markerfacecolor','b','markersize',4);

ylabel('Elevation (deg)');
xlabel('Time (hr)');

grid(ax4,'on');

title(ax4,{'\fontsize{11}\bfElevation Angle';'\bfof Satellites Seen by Antenna'});

```

CLOUSE: Load 9/27 data and subtract to find the satellite az/el diff

```

GPSdata_new=GPSdata;
load('GPS927.mat')
%Display the az/el diffs
GPSdata_new.prn(1,GPSdata_new.topo_el(1,:)>0)
GPSdata_new.topo_az(1,GPSdata_new.topo_el(1,:)>0)-GPSdata.topo_az(1,GPSdata_new.to
GPSdata_new.topo_el(1,GPSdata_new.topo_el(1,:)>0)-GPSdata.topo_el(1,GPSdata_new.to

```

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