SOP to download the solar system object (mars) coordinates from the JPL/NASA web site and convert them in to the GMRT source list format.
28Jul2016

Link: http://ssd.jpl.nasa.gov./horizons.cgi?s_body=1#top
(use any astro/gtac machine for downloading the coordinates)

Input Setup:

Now click on each [change] link and set the desired input parameters as follows

* set Ephemeris Type : OBSERVER

* set Target Body: MARS

* set Observer Location :
  Longitude: 74.05 (East)
  Latitude: 19.1 (North)
  Altitude: 650 (meters)
  Body ID: 399 (Earth)

* set Time span:
  Start Time: 2015-12-15 (yyyy-mm-dd)
  Stop Time : 2015-12-15 (yyyy-mm-dd)
  Step Size : 15 (minutes)

* set Table Settings: (select only 2 and 3)
  2. Apparent RA & DEC (current epoch)
  3. Rates; RA & DEC

  Optional observer-table settings: (do not change)
  * Date/time format: Calender Date/Time
  * Angle format : hours/degrees minutes seconds

* set Display/Output: download/save

Now press "Generate Ephemeris" button to download/save the output.

Saved/downloaded file will look like as follows:
(horizons_results.txt @ astro/gtac machine).

```
*****************************************************************************
 Date__(UT)__HR:MN     R.A.__(r-apparent)__DEC dRA*cosD d(DEC)/dt
*****************************************************************
$$SOE
 2016-Sep-27 00:00 Am  18 01 21.35 -26 16 03.9 99.80377  1.888183
 2016-Sep-27 00:15 Nm  18 00 52.23 -26 23 27.6 99.82603  1.834382
 2016-Sep-27 00:30 Nm  17 59 51.14 -26 30 46.4 99.83938  1.780202
 2016-Sep-27 00:45 Cm  17 58 25.05 -26 31 02.9 99.84378  1.725900
 2016-Sep-27 01:00 *m  17 57 21.80 -26 23 54.6 99.83924  1.671729
 2016-Sep-27 01:15 *m  17 56 51.28 -26 16 24.3 99.82580  1.617947
 2016-Sep-27 01:30 *m  17 56 37.83 -26 10 46.7 99.80352  1.564806
 2016-Sep-27 01:45 *m  17 56 31.89 -26 06 41.9 99.77254  1.512556
 2016-Sep-27 02:00 *m  17 56 29.42 -26 03 38.1 99.73299  1.461445
 2016-Sep-27 02:15 *m  17 56 28.73 -26 01 13.8 99.68507  1.411714
 2016-Sep-27 02:30 *m  17 56 29.02 -25 59 15.7 99.62901  1.363600
 2016-Sep-27 02:45 *m  17 56 29.91 -25 57 35.6 99.56506  1.317331
```

Now execute the script ~astrosupp/perl/coord/jpl_nasa_to_gmrt_src_list.pl on the above downloaded file horizons_results.txt. It will generate new coordinates in to the GMRT source list format, mars.list . It will also generated the command file, mars.cmd.

e.g.

```
~astrosupp/perl/coord/jpl_nasa_to_gmrt_src_list.pl  -i  horizons_results.txt  -o  mars.list  -s MARS
```
(help: ~astrosupp/perl/coord/jpl_nasa_to_gmrt_src_list.pl -h)

output file (mars.list) will look like as follows.

```
* IST: 27Sep2016 05:30   UTC: 27Sep2016 00:00   dRa: 6.7s/60m   dDec: 1.9"/60m
SRC000       18h01m21.35s  -26d16'03.9"  2016.74195756331


* IST: 27Sep2016 05:45   UTC: 27Sep2016 00:15   dRa: 6.7s/60m   dDec: 1.8"/60m
SRC0001      18h00m52.23s  -26d23'27.6"  2016.74195756331


* IST: 27Sep2016 06:00   UTC: 27Sep2016 00:30   dRa: 6.7s/60m   dDec: 1.8"/60m
SRC0002      17h59m51.14s  -26d30'46.4"  2016.74195756331


* IST: 27Sep2016 06:15   UTC: 27Sep2016 00:45   dRa: 6.7s/60m   dDec: 1.7"/60m
SRC0003      17h58m25.05s  -26d31'02.9"  2016.74195756331


* IST: 27Sep2016 06:30   UTC: 27Sep2016 01:00   dRa: 6.7s/60m   dDec: 1.7"/60m
SRC0004      17h57m21.80s  -26d23'54.6"  2016.74207164043
```

TRACKING of SOURCES with dRa/dt and dDec/dt through online.

Online commands to track the mars.

* gts'MARSXXX'
* scoord(11) is dRA/dt
* scoord(13) is dDEC/dt
* scoord(14) is Reference time in IST
* sndsacsrc to track the antennas with given coordinates and rate

e.g.

```
gts 'MARS100'                    <---- source name, last three chars are the Sr. No.
scoord(14)=10h00m                <---- reference time in IST
scoord(11)=(5s/60m)              <---- dRa/dt in second/hour
scoord(13)=(-32"/60m)            <----  dDec/dt in arcsecond/hour

sndsacsrc(1,12h)
stabct
/(gotosrc)

strtndas
....
....
stpndas
….
….
```

Note: Please use your account to download and script execution. After script execution, transfer the output files (mars.list and mars.cmd) to online machine for observations and change commad file as per the users requirments.