GPS—VLBI CLOCK DIFFERENCES

R. C. Walker

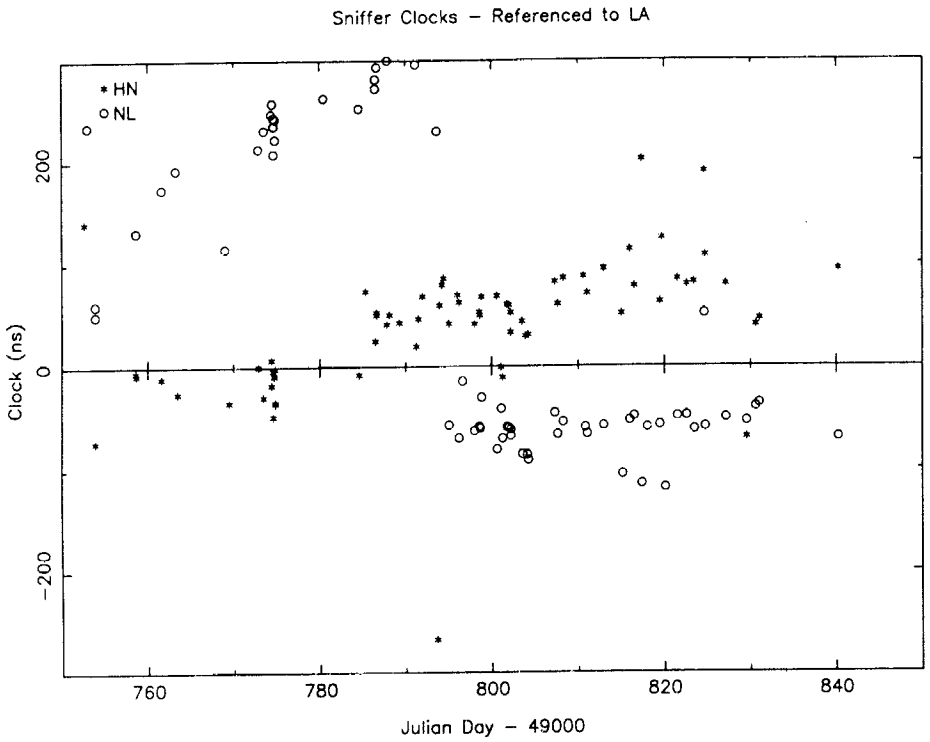
May 15, 1995

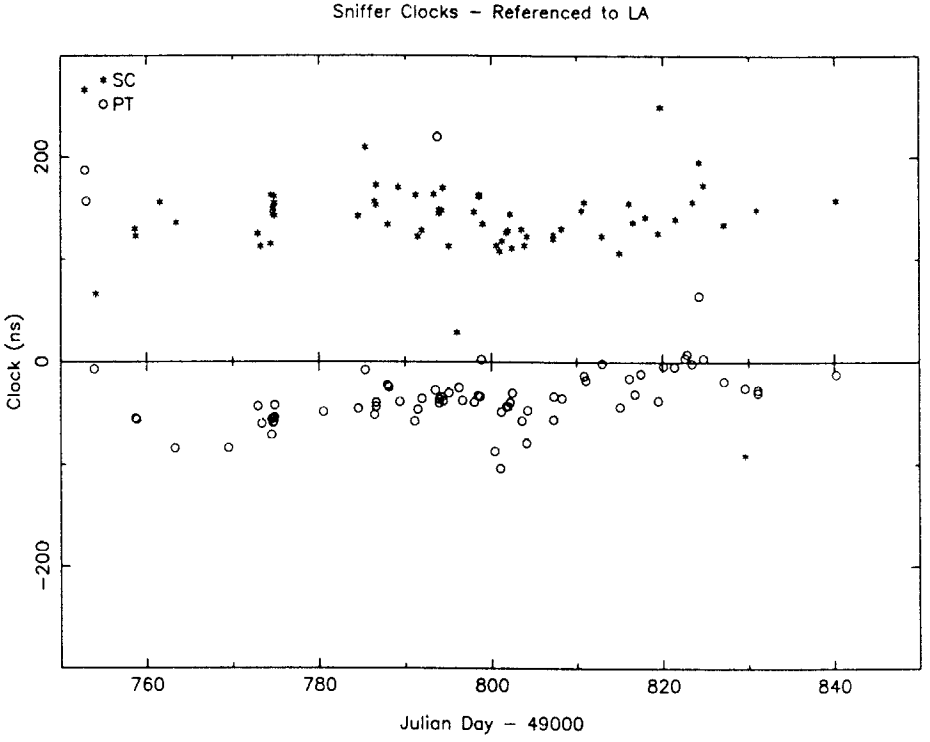
I have used the sniffer output from all experiments sniffed by the analysts for the last few months to investigate the difference between the clocks as determined by GPS and those determined by fringe fitting VLBI data. The hope was to find some systematic offsets that could then be used as corrections to the GPS data to allow better estimates of clocks for correlation. I wrote a program (CLOCKHIST) that reads the "datafile.lis" files on terminus2 for all observations and collects the amplitude, delay, and rate for the point with the highest amplitude for each baseline for each experiment. The delays are then corrected to a common reference antenna. These data will be very non-uniform. There is a mixture of BBC's, bandwidths, and RF frequencies. However, if a clear trend shows up, that is a good sign that we can make useful corrections without taking all these confusing factors into account.

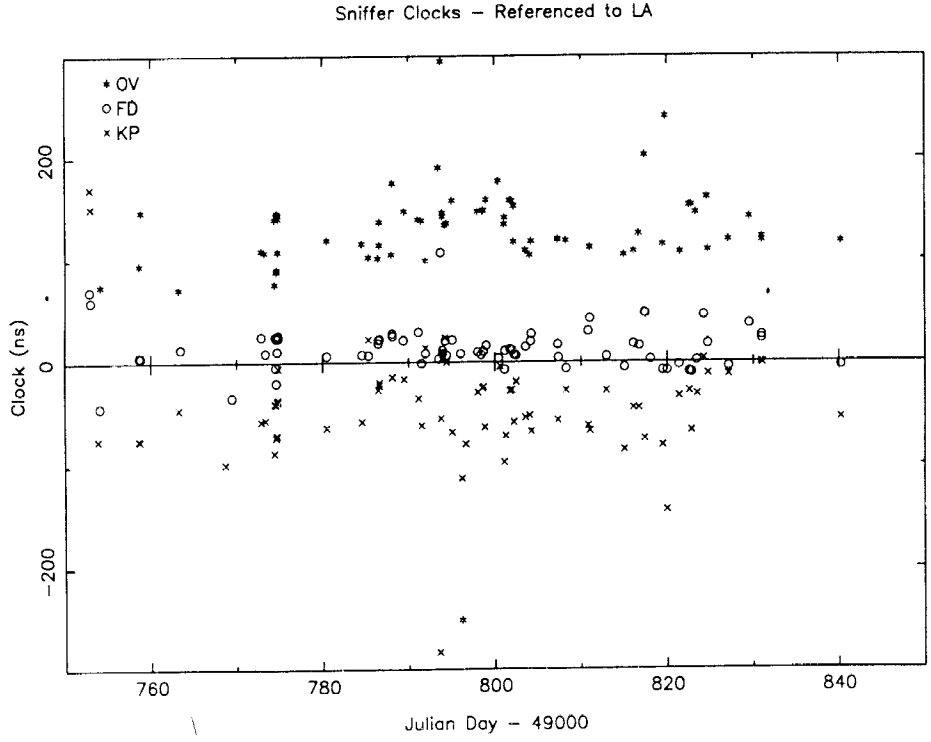
The data are shown on the attached plots which show the VLBI delay offset of each station with respect to Los Alamos. The GPS comparison occurs in the sense that the observations were processed using the GPS clocks, so the VLBI residuals are just the differences between GPS and VLBI. Note that, within a single experiment, it is common for the single band delays to vary up to about 50 ns between baseband channels. Therefore, a scatter of at least that amount is expected. In fact, for the last couple of months, this can account for a significant fraction of the scatter seen in the plots. It really does look like we can make useful corrections. Below, I list the corrections implied by these data and suggest that they be used on a test experiment. If that is ok, they could be applied routinely.

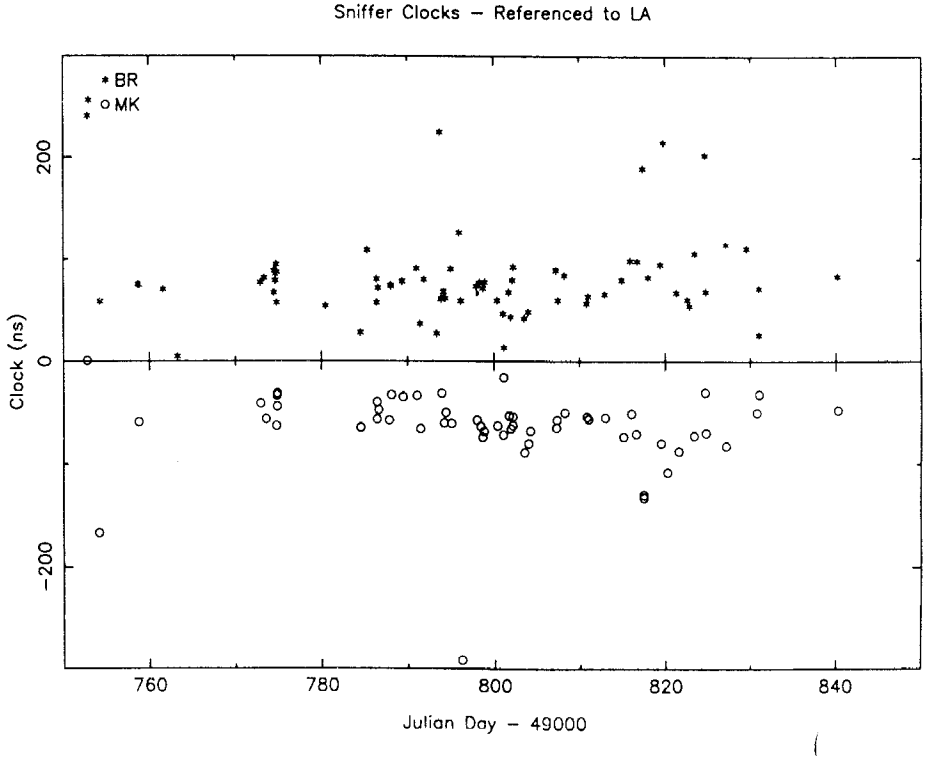
I have talked to Larry Beno and it is not clear, at this time, what causes the differences between sites. Certainly, if we use these corrections for processing, we have to watch carefully to catch any changes when they occur.

VLBI Delay wrt LA	
Station	VLBI Delay (ns)
SC	140
HN	70
NL	–50
FD	20
PT	–20
KP	–40
OV	130
BR	80
MK	–70


Sniffer Clocks – Referenced to LA
HN
NL
Clock (ns)
200
0
-200
760
780
800
820
840
Julian Day – 49000


Sniffer Clocks – Referenced to LA
SC
PT
Clock (ns)
200
0
-200
760
780
800
820
840
Julian Day – 49000


Sniffer Clocks – Referenced to LA
OV
FD
KP
Clock (ns)
200
0
-200
760
780
800
820
840
Julian Day – 49000


Sniffer Clocks – Referenced to LA
BR
MK
Clock (ns)
200
0
-200
760
780
800
820
840
Julian Day – 49000