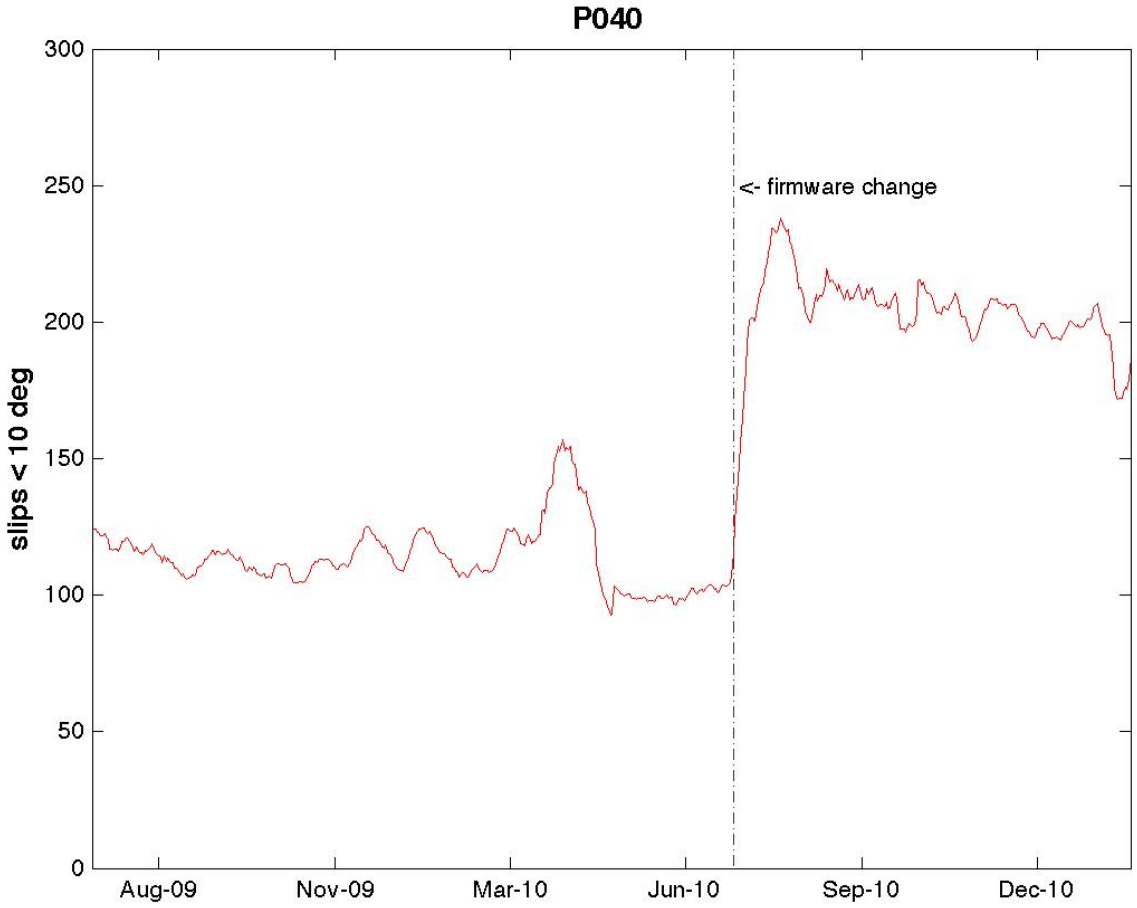
Trimble NetRS - tracking behavior changes after firmware upgrade

698 Henry Berglund March 10, 2011 GNSS Receiver Test Reports, Trimble NetRS 590

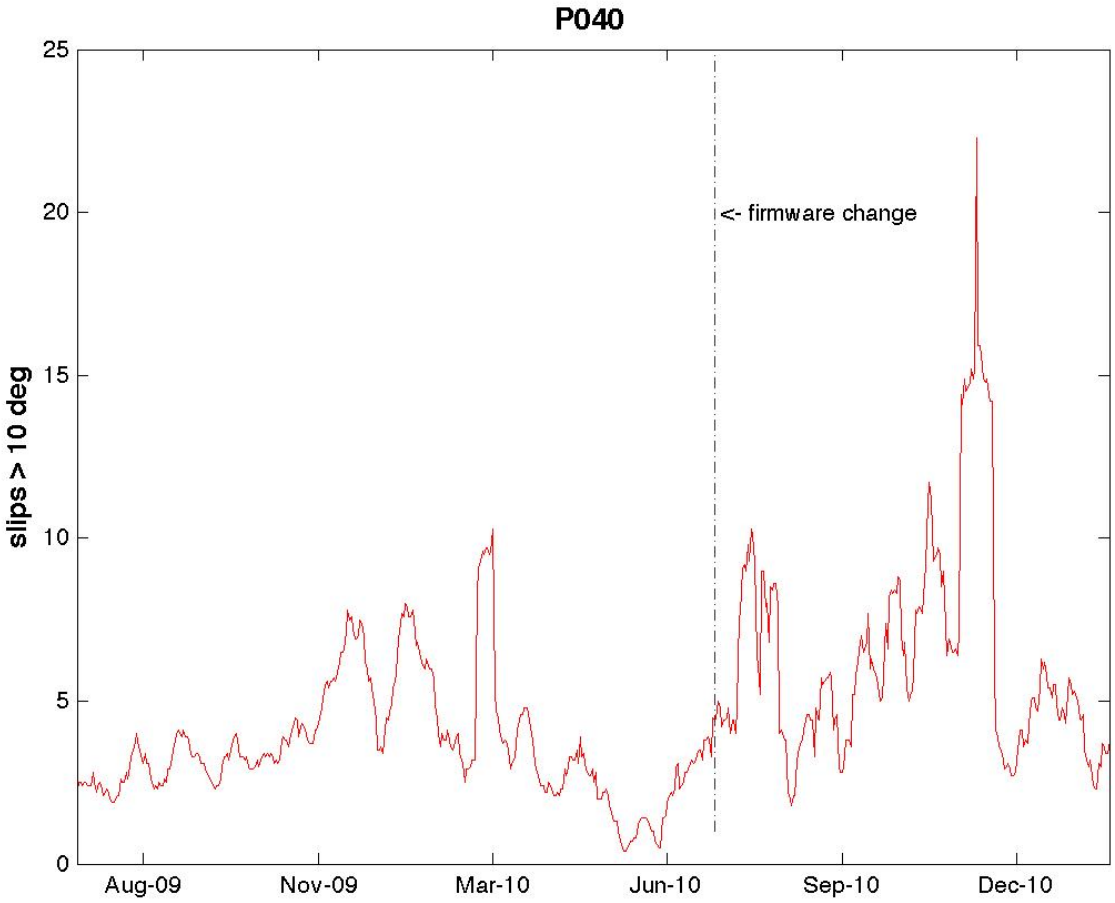
Using the quality check function in Teqc, we analyzed RINEX observation files from two GPS sites in the PBO network over a period of ~2 years. Both the sites in this analysis were equipped with Trimble NetRS receivers. We observed changes in the tracking behavior of the receivers at these sites after their firmware had been upgraded. The change in tracking behavior at each site occurred after the firmware was upgraded to version 1.2-0 or greater. Using the quality check summary file from each day, we plotted several values that are indicators of receiver performance. For clarity we smoothed the data in each figure with a 10-day moving average.

The following figure shows 24-hour totals of MP or IOD slips that occur at the site P040 when the elevation angles were < 10 degrees. The gray dashed line indicates when the receiver firmware at P040 was upgraded from 1.1-2 to 1.3-0. The average number of IOD or MP slips before the firmware change is 113. The average IOD or MP slips after the firmware change is 205.

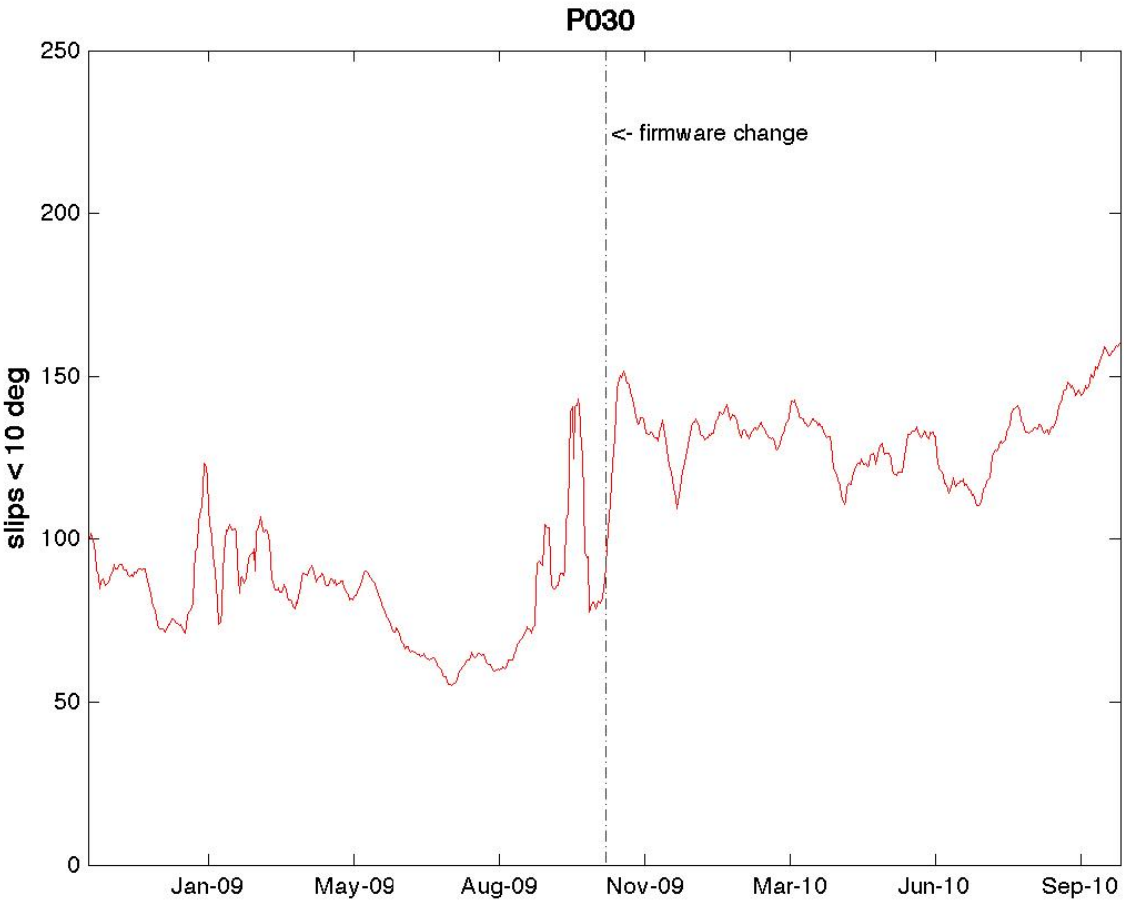


The following figure shows 24-hour totals of MP or IOD slips that occur at the site P040 when the

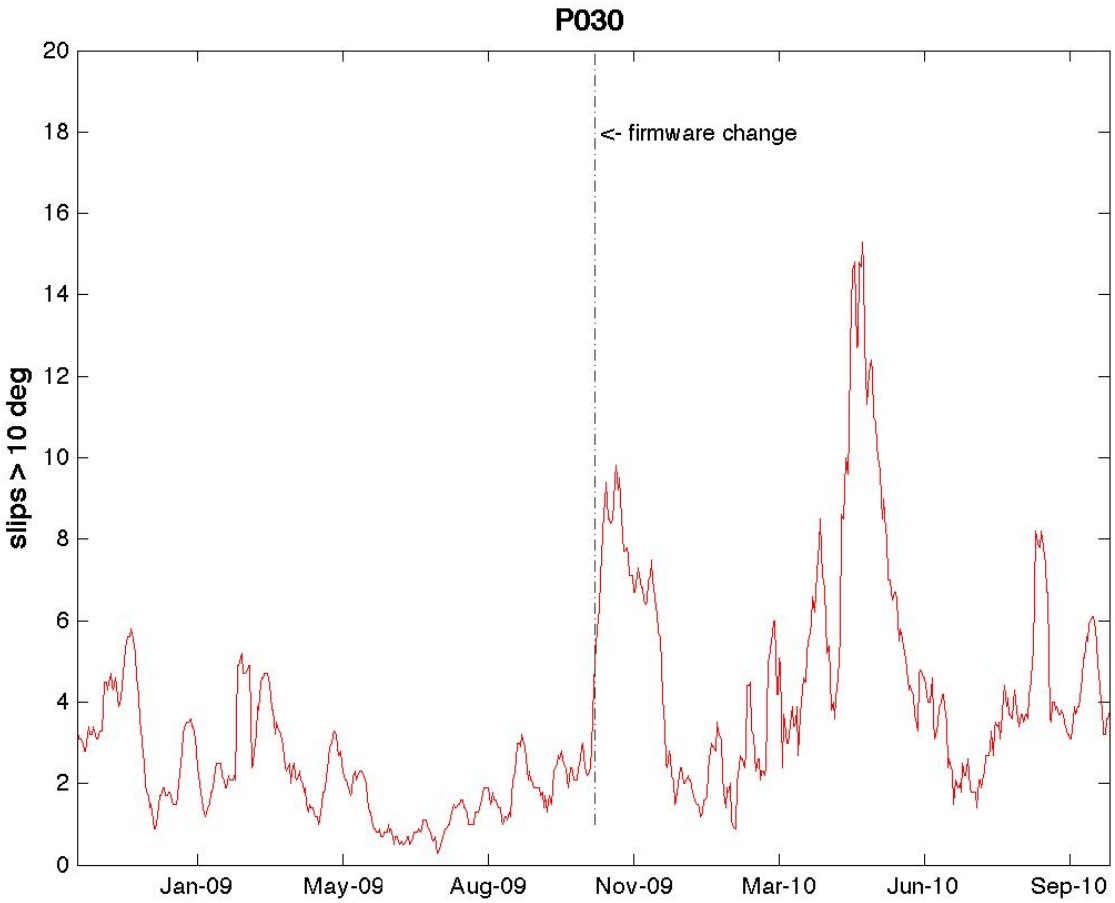
elevation angles were > 10 degrees. The average number of IOD or MP slips before the firmware change is 3.67. The average IOD or MP slips after the firmware change is 6.33.



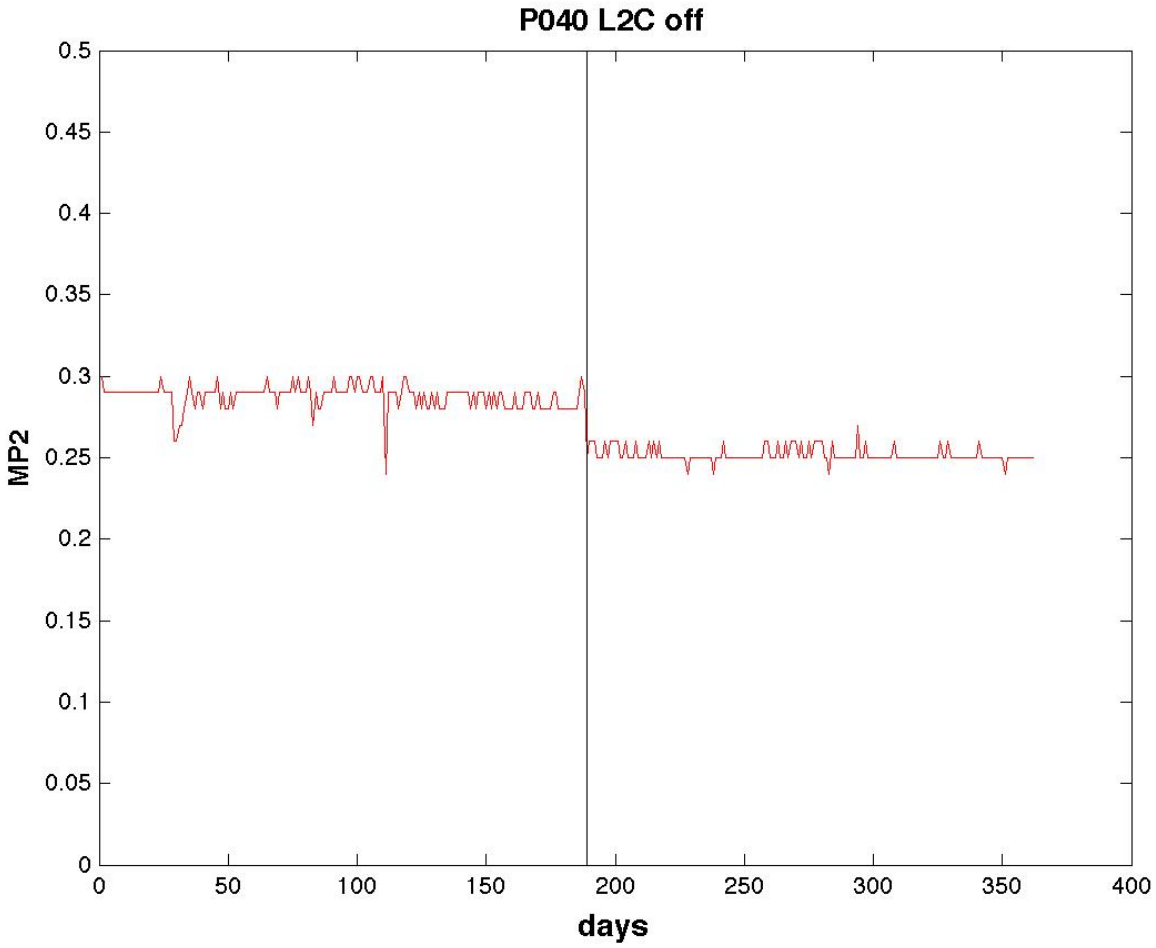
The following figure shows 24-hour totals of MP or IOD slips that occur at the site P030 when the elevation angles were < 10 degrees. The gray dashed line indicates when the receiver firmware at P030 was upgraded from 1.1-2 to 1.3-0. The average number of IOD or MP slips before the firmware change is 83. The average IOD or MP slips after the firmware change is 133.

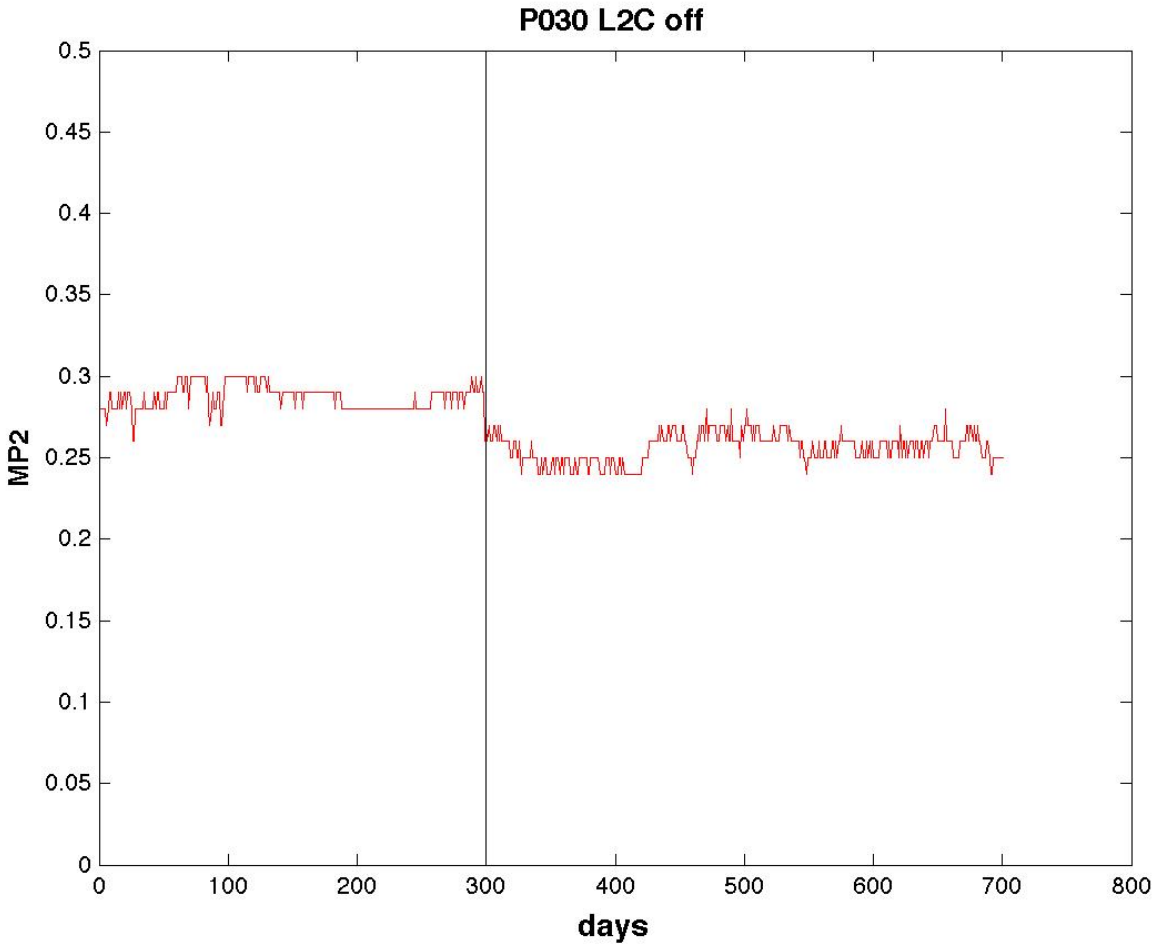


The following figure shows 24-hour totals of MP or IOD slips that occur at the site P030 when the elevation angles were > 10 degrees. The average number of IOD or MP slips before the firmware change is 2.34. The average IOD or MP slips after the firmware change is 4.90.



We also observed decreases in MP2 values after the firmware was updated at the sites P040 and P030. The figures below shows the MP2 values calculated by Teqc with respect to time.


P040 L2C off
MP2
days
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
50
100
150
200
250
300
350
400



Summary

Both the number of slips above and below 10 degrees elevation increased after the firmware at P030 and P040 was upgraded. The following table summarizes the change in the average number of slips at each site before and after the NetRS receivers at each site were upgraded with firmware version 1.3-0. MP2 values decreased at both P030 and P040 following the firmware upgrades at these sites.

P040		
Average IOD or MP slips < 10 degrees	Before fw change: 113	After fw change: 205
Average IOD or MP slips > 10 degrees	Before fw change: 3.67	After fw change: 6.33
P030		
Average IOD or MP slips < 10	Before fw change: 83	After fw change: 133

degrees		
Average IOD or MP slips > 10 degrees	Before fw change: 2.34	After fw change: 4.90