

WAAS Web Application Portal

Operational Test and Evaluation (OTE) Display

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Overview

Introduction

As part of the William J. Hughes Technical Center WAAS Test Team website (www.nstb.tc.faa.gov), the WAAS Web Application Portal allows you to view The Operational Test and Evaluation (OTE) display which depicts receiver data in real-time.

This website allows you to:

- View trends and analyze current data by choosing parameters you want to view
- Check the status of satellites in relation to receivers
- Observe the receivers' position and range data

The following information shows you how to navigate the website. First, click on the "WAAS Web Application Portal" (See red arrow below).

Welcome to the William J. Hughes Technical Center WAAS Test Team

Please use the navigation bar at the left to view our products. The real-time performance plots are created every three minutes, and all real-time plot pages update every two minutes. The real-time plots show up to the minute WAAS performance. The 24-hour performance plots show yesterday's performance using the total 24-hours of data. Any daily plot page updates every 24 hours. Real-time data files update every three minutes as well. Performance videos show animated performance data for the previous 24-hour period. They can be viewed in Windows media player. Please see video help for further assistance. Performance analysis reports are updated quarterly, and contain the most detailed analyses of GPS and WAAS performance. The WAAS technical reports coincide with links contained in the PAN reports and give detailed analysis on specific problem occurrences.

• Real-Time Interactive WAAS Performance Applications
- [2D Display](#)
- [3D Display](#)
- (Requires Google Earth)

• Additional WAAS/GPS Web Applications
- [WAAS Web Application Portal](#) 




William J. Hughes FAA Technical Center

Once you click the red arrow, you come to the screen below. To access the OTE Display, click on OTE display (See red arrow below).

Welcome to The William J. Hughes Technical Center WAAS Test Team
Interactive Web Application Portal

Disclaimer: The data on this website is for information only and should not be used for flight planning.

Real-Time Applications

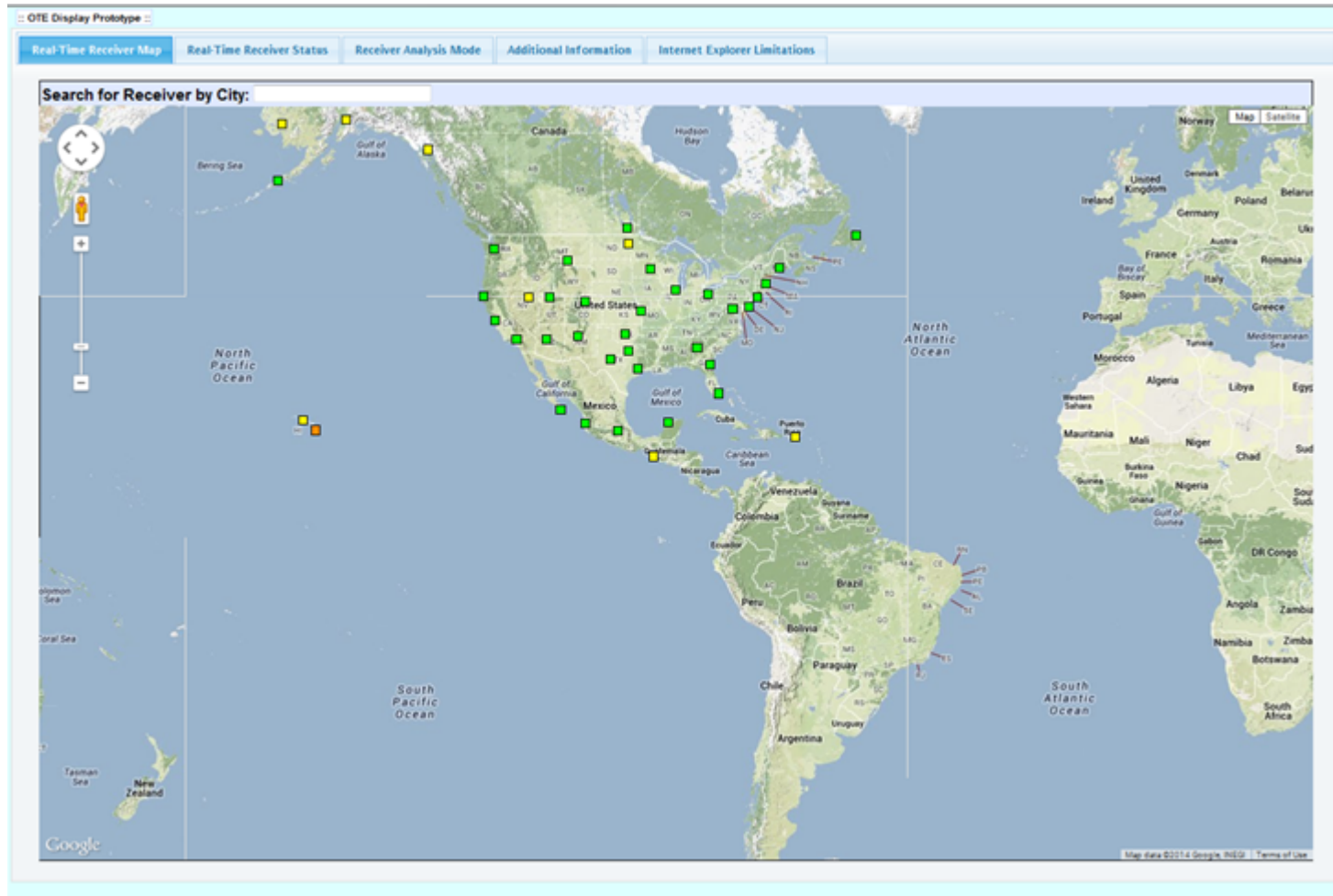
-  [OTE Display](#) - Real-Time Receiver Data Display
- [SMS Display](#) - Real-Time Service Monitoring Subsystem Display
- [SBAS Display \(Coming Soon\)](#) - Real-Time EGNOS / MSAS / WAAS Display

Reporting Applications

- [Airport Actual Outages](#) - Provides "rolled up" airport outage information on a geographic display
- [Airport Schedules](#) - Shows predicted airport schedules for the next two weeks
- [Interactive PAN Report](#) - Allows for interactive generation of select PAN Report Tables over a user specified period of time
- [NPA SPS Summary](#) - Summary NPA SPS Statistics
- [PA Summary](#) - Summary PA Statistics
- [Rollup Display](#) - Displays aggregated airport and IGP statistics on a geographic display
- [SMS Animation Display](#) - Animates SMS data over user selected time periods on an interactive geographic display
- [UDREI Daily Graphs](#) - Displays savable UDREI GEO graphs for a given day

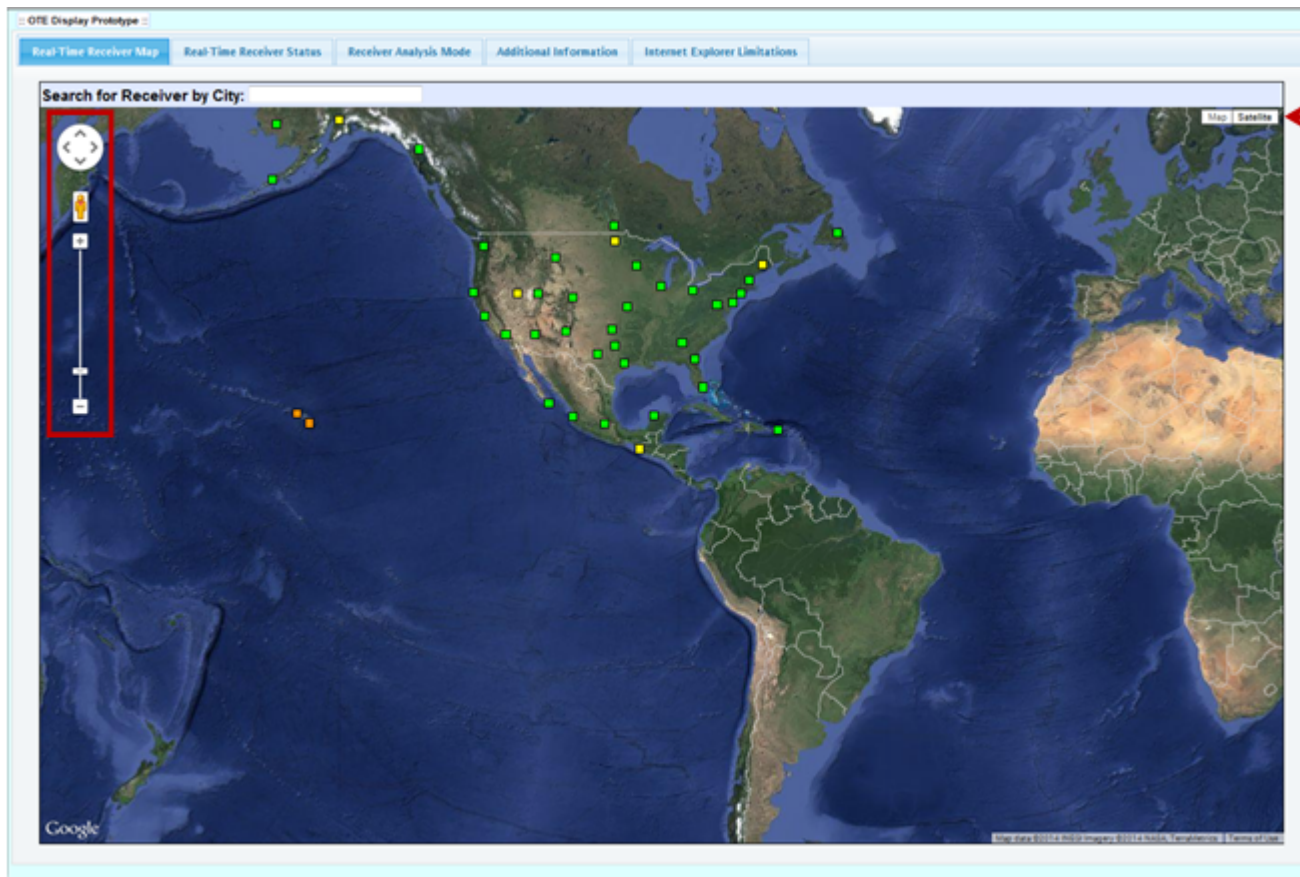
Map View

Once you enter the OTE Display, you will see an image similar to the one below. This is the Real Time Receiver Map in Map View. This is the view you see once you click on OTE Display within the WAAS Web Application Portal.



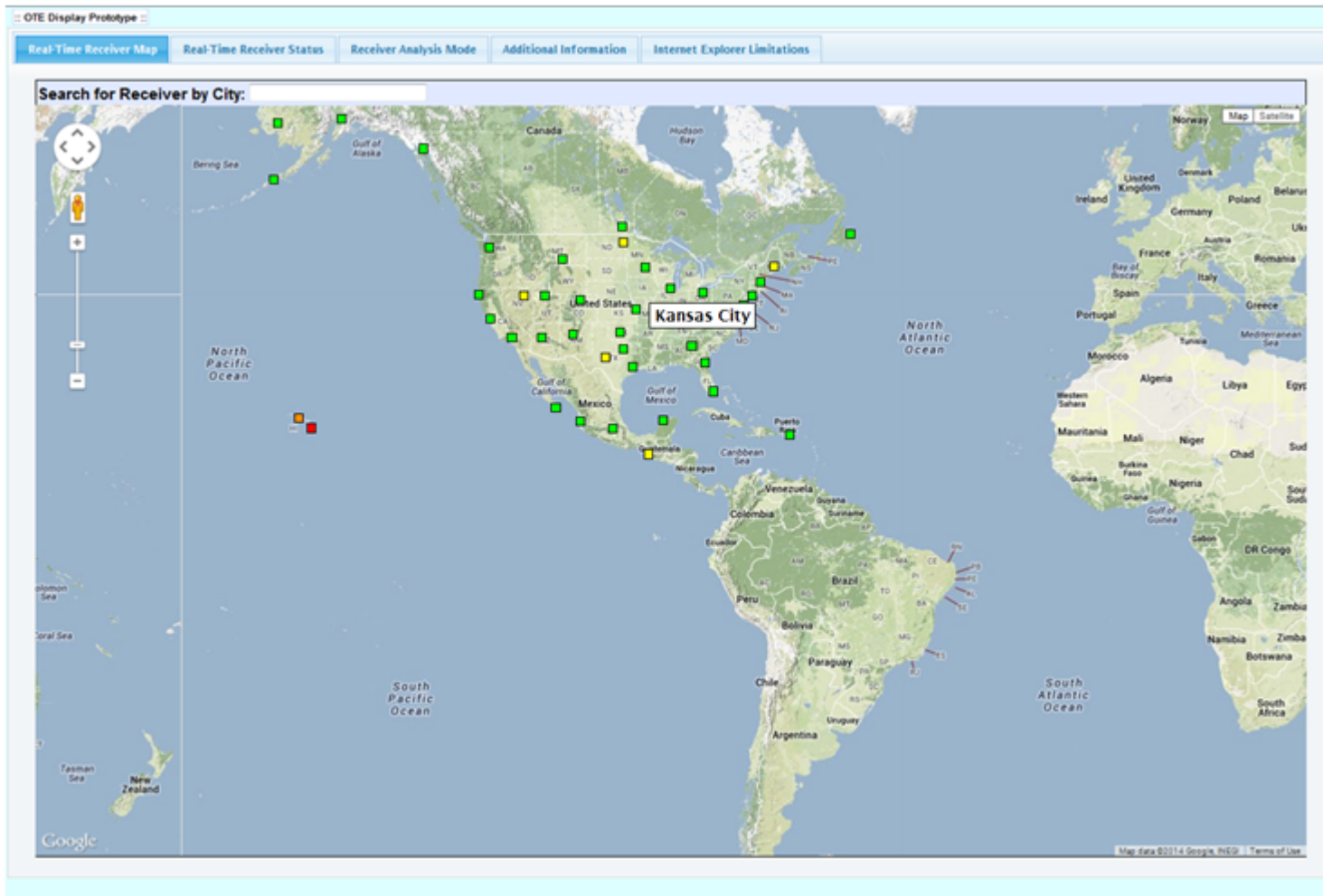
Satellite View

The same map can be seen in Satellite View by clicking on the Satellite button in the upper right corner of the Map (See #1 below). As can be done with all Google Maps, you may zoom in and out by sliding the zoom control on the upper left corner of the map or the by scrolling with the scroll wheel your computer mouse. You may also pan left/right/up/down using the Pan control or go to street view using Pegman, the little yellow person icon (See the red box below).

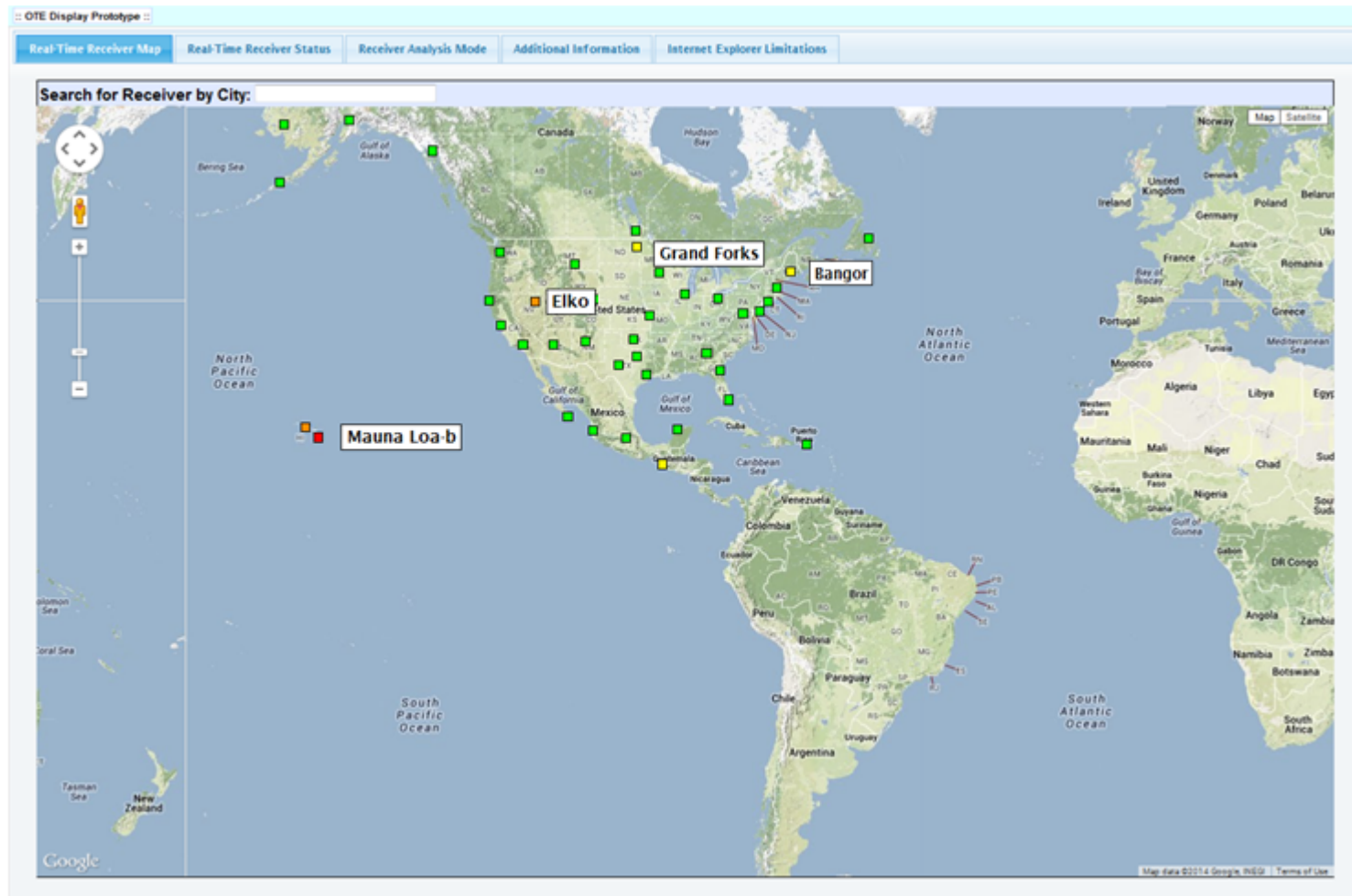


The Receivers

The boxes on the screen show both WAAS and National Satellite Test Bed (NSTB) receivers. To see the name of the receiver, place the cursor over a box. Below we placed our cursor over Kansas City.



Any box other than a green box indicates that one or more parameters have exceeded predetermined thresholds for Flag, Up Error or Valid Sats. For instance, the yellow boxes of Grand Forks and Bangor indicate that either Flag is ≥ 1 , and/ or Up (i.e. vertical) Error is ≥ 1.5 meters. The orange box at Elko could be due to the Flag being ≥ 3 or the Up Error ≥ 2.5 meters. If the box is red, as in Mauna Loa-b below, it could indicate that the Flag or Up error is ≥ 5 meters or the number of Valid Sats used in the position solution is ≤ 4 .



Position Data Tab

To check the position data and/or to see which parameters are exceeding threshold, click on the colored box to open another dialog box. Below, we clicked on the Grand Forks receiver. The Position Data tab is open in the dialog box (See red box below). The red arrow is pointing to the Up Error. Any Up Error ≥ 1.5 will change the box on the map to yellow. Notice the Up Error in the pop up dialog box is highlighted by a black box with yellow writing. The writing will be the same color as the box color. If this was a red box, the font would also be red.

Please note: this pop up dialog box may be moved by grabbing the header bar next to the name, just click with your mouse and hold. Release once you have moved the box to the new location.

Grand Forks

Position Data | Satellite Status | Range Data

Receiver ID:	5936	ID Hex:	1730
Time:	17:05:27 GMT	Wktime:	320742
Location:	Grand_Forks	City:	Grand Forks

<input type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1
<input type="checkbox"/> Sat Valid:	12	<input type="checkbox"/> Flag:	0
<input type="checkbox"/> HDOP:	0.758	<input type="checkbox"/> VDOP:	1.209
<input type="checkbox"/> HPL:	9.786	<input type="checkbox"/> VPL:	14.357
<input type="checkbox"/> Geo Stream:	138	<input type="checkbox"/> Up Error:	1.624
<input type="checkbox"/> East Error:	-0.091	<input type="checkbox"/> North Error:	0.21

View the past 15 minutes

Enable Trend Monitor | Analyze Current Data

Map: Grand Forks, North Dakota

Definitions within the Position Data Tab

The position data tab for Washington DC is shown below. The receiver ID, time and location are highlighted by the red box. Definitions follow below:

- **The Receiver ID and ID Hex** are unique to each receiver.
- **Time** corresponds to GMT time.
- **Wktime** is the GPS time in number of seconds into the week.
- **Location and City** identify the receiver and its location. The location is a code for which of the three receivers at a reference station is being used

The screenshot shows a software window titled "Washington DC" with a close button (X) in the top right corner. Below the title bar are three tabs: "Position Data" (selected), "Satellite Status", and "Range Data". The "Position Data" tab contains a table with the following data:

Receiver ID:	28609	ID Hex:	6FC1
Time:	18:37:18 GMT	Wktime:	326253
Location:	wzdcwrsp1c1	City:	Washington DC

Below this table is another table with various parameters, each with a checkbox:

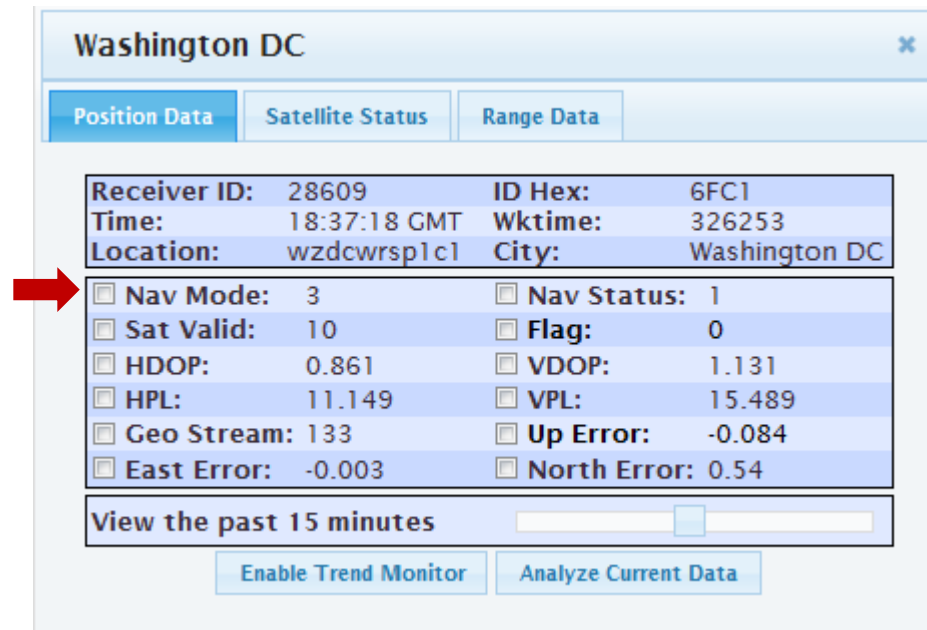
<input type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1
<input type="checkbox"/> Sat Valid:	10	<input type="checkbox"/> Flag:	0
<input type="checkbox"/> HDOP:	0.861	<input type="checkbox"/> VDOP:	1.131
<input type="checkbox"/> HPL:	11.149	<input type="checkbox"/> VPL:	15.489
<input type="checkbox"/> Geo Stream:	133	<input type="checkbox"/> Up Error:	-0.084
<input type="checkbox"/> East Error:	-0.003	<input type="checkbox"/> North Error:	0.54

At the bottom of the window, there is a section titled "View the past 15 minutes" with a slider control. Below this are two buttons: "Enable Trend Monitor" and "Analyze Current Data". A red bracket on the left side of the window highlights the Receiver ID, Time, and Location fields in the first table.

Nav Mode in the Position Data Tab shows which corrections are being used, if any (See below). There are three Nav Modes:

- **Mode 1** is GPS Standard Positioning Service (SPS). No WAAS Correction is being used.
- **Mode 2** indicates Non precision Approach (NPA) with only WAAS fast and long-term corrections being used. There are no ionospheric corrections used.
- **Mode 3** shows a Precision Approach (PA) where all WAAS corrections are being used.

When possible this is always in mode 3. As long as there are at least 4 satellites with WAAS corrections, the Nav Mode is in PA mode.



The screenshot shows a software interface for 'Washington DC' with three tabs: 'Position Data', 'Satellite Status', and 'Range Data'. The 'Position Data' tab is active, displaying a table of receiver information and navigation parameters. A red arrow points to the 'Nav Mode: 3' field in the table.

Washington DC					
Position Data		Satellite Status		Range Data	
Receiver ID:	28609	ID Hex:	6FC1		
Time:	18:37:18 GMT	Wktime:	326253		
Location:	wzdcwrsp1c1	City:	Washington DC		
<input type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1		
<input type="checkbox"/> Sat Valid:	10	<input type="checkbox"/> Flag:	0		
<input type="checkbox"/> HDOP:	0.861	<input type="checkbox"/> VDOP:	1.131		
<input type="checkbox"/> HPL:	11.149	<input type="checkbox"/> VPL:	15.489		
<input type="checkbox"/> Geo Stream:	133	<input type="checkbox"/> Up Error:	-0.084		
<input type="checkbox"/> East Error:	-0.003	<input type="checkbox"/> North Error:	0.54		

View the past 15 minutes

Position Data Parameters

More position data parameters are defined below:

Sat. Valid indicates how many GPS and GEO satellites are being used to calculate the solution.

HDOP shows Horizontal Dilution of Precision

HPL shows the Horizontal Protection Level.

Geo Stream indicates which of the 3 WAAS Satellites are being used.

East Error shows the error in meters from the east. Like North Error, East Error corresponds to Horizontal Position Error.

Washington DC					
Position Data		Satellite Status		Range Data	
Receiver ID:	28609	ID Hex:	6FC1		
Time:	18:37:18 GMT	Wktime:	326253		
Location:	wzdcwrsp1c1	City:	Washington DC		
<input type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1		
<input type="checkbox"/> Sat Valid:	10	<input type="checkbox"/> Flag:	0		
<input type="checkbox"/> HDOP:	0.861	<input type="checkbox"/> VDOP:	1.131		
<input type="checkbox"/> HPL:	11.149	<input type="checkbox"/> VPL:	15.489		
<input type="checkbox"/> Geo Stream:	133	<input type="checkbox"/> Up Error:	-0.084		
<input type="checkbox"/> East Error:	-0.003	<input type="checkbox"/> North Error:	0.54		

View the past 15 minutes

San Angelo ✕

Position Data Satellite Status Range Data

Receiver ID: 6786	ID Hex: 1A82
Time: 19:45:19 GMT	Wktime: 330334
Location: San_Angelo	City: San Angelo

<input type="checkbox"/> Nav Mode: 3	<input type="checkbox"/> Nav Status: 1
<input type="checkbox"/> Sat Valid: 13	<input type="checkbox"/> Flag: 1
<input type="checkbox"/> HDOP: 0.711	<input type="checkbox"/> VDOP: 0.98
<input type="checkbox"/> HPL: 9.072	<input type="checkbox"/> VPL: 13.017
<input type="checkbox"/> Geo Stream: 138	<input type="checkbox"/> Up Error: 0.194
<input type="checkbox"/> East Error: 0.246	<input type="checkbox"/> North Error: 0.019

View the past 15 minutes

[Enable Trend Monitor](#) [Analyze Current Data](#)

Nav Status is usually 0 or 1. As long as it is 1, a valid solution is being calculated. If not, the solution is invalid. This could be due to a number of reasons including not having enough satellites or satellites being off-line.

Flag:

- If this number is 0, the receiver is valid.
- If the number is -1, the solution has diverged.
- A number between 1-10 indicates the number of healthy satellites not being used. For example, here, the area highlighted in black shows the San Angelo receiver is not using one (1) of the satellites available to it.

VDOP is Vertical Dilution of Precision.

VPL is Vertical Protection Level.

Up Error is also called Vertical Position Error.

North Error is North Position Error. Like East error, North Error corresponds to Horizontal Position Error.

Sliding Scale

A sliding scale allows you to view past activity of any chosen parameters between 30 or 60 minutes, depending on which internet browser you use. Internet Explorer allows you to view the past 30 minutes, while Chrome and Firefox allow you to view up to 60 minutes (See below).

Internet Explorer allows you to view up to 30 minutes



Boston

Position Data | Satellite Status | Range Data

Receiver ID:	28353	ID Hex:	6EC1
Time:	15:36:02 GMT	Wktime:	401777
Location:	wzbwwrsp1c1	City:	Boston

<input type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1
<input type="checkbox"/> Sat Valid:	12	<input type="checkbox"/> Flag:	0
<input type="checkbox"/> HDOP:	0.769	<input type="checkbox"/> VDOP:	1.19
<input type="checkbox"/> HPL:	11.1	<input type="checkbox"/> VPL:	15.644
<input type="checkbox"/> Geo Stream:	133	<input type="checkbox"/> Up Error:	0.619
<input type="checkbox"/> East Error:	0.045	<input type="checkbox"/> North Error:	0.543

View the past 30 minutes

Enable Trend Monitor | Analyze Current Data

Chrome allows you to view up to 60 minutes



Boston

Position Data | Satellite Status | Range Data

Receiver ID:	28353	ID Hex:	6EC1
Time:	15:36:01 GMT	Wktime:	401777
Location:	wzbwwrsp1c1	City:	Boston

<input type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1
<input type="checkbox"/> Sat Valid:	12	<input type="checkbox"/> Flag:	0
<input type="checkbox"/> HDOP:	0.769	<input type="checkbox"/> VDOP:	1.19
<input type="checkbox"/> HPL:	11.1	<input type="checkbox"/> VPL:	15.644
<input type="checkbox"/> Geo Stream:	133	<input type="checkbox"/> Up Error:	0.619
<input type="checkbox"/> East Error:	0.045	<input type="checkbox"/> North Error:	0.543

View the past 60 minutes

Enable Trend Monitor | Analyze Current Data

Enable Trend Monitor in Position Data

By clicking on a few of the parameters and then clicking the “Enable Trend Monitor” box (See boxes and arrow below), you can monitor the performance of the parameter(s) you want to view.

The screenshot shows a web interface for 'New York' with three tabs: 'Position Data', 'Satellite Status', and 'Range Data'. The 'Position Data' tab is active, displaying a table of parameters with checkboxes. A red arrow points to the 'Enable Trend Monitor' button at the bottom.

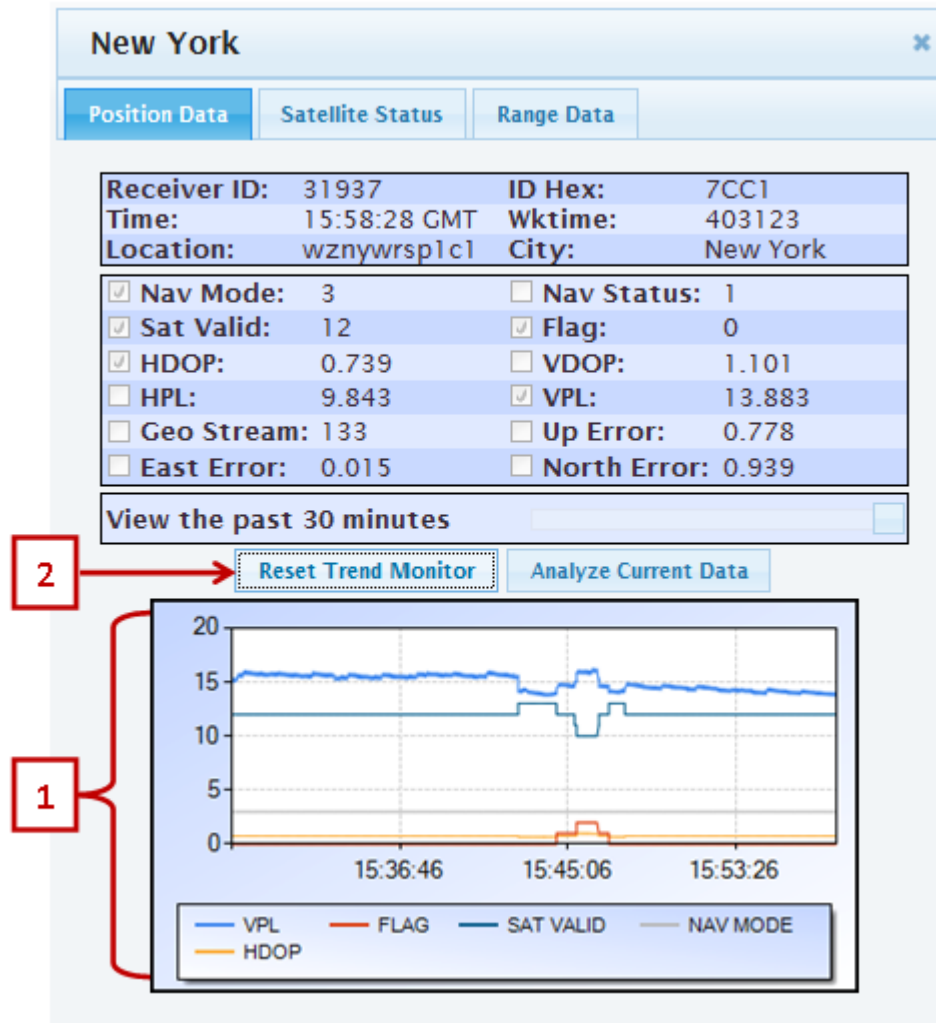
Parameter	Value	Checkbox
Receiver ID:	31937	<input type="checkbox"/>
Time:	15:52:21 GMT	<input type="checkbox"/>
Location:	wznywrsp1c1	<input type="checkbox"/>
ID Hex:	7CC1	<input type="checkbox"/>
Wktime:	402756	<input type="checkbox"/>
City:	New York	<input type="checkbox"/>
Nav Mode:	3	<input checked="" type="checkbox"/>
Nav Status:	1	<input type="checkbox"/>
Sat Valid:	12	<input checked="" type="checkbox"/>
Flag:	0	<input checked="" type="checkbox"/>
HDOP:	0.741	<input type="checkbox"/>
VDOP:	1.11	<input type="checkbox"/>
HPL:	10.324	<input type="checkbox"/>
VPL:	14.34	<input checked="" type="checkbox"/>
Geo Stream:	133	<input type="checkbox"/>
Up Error:	1.102	<input type="checkbox"/>
East Error:	-0.035	<input type="checkbox"/>
North Error:	1.067	<input type="checkbox"/>

View the past 30 minutes

Enable Trend Monitor

Once you click the “Enable Trend Monitor” box, it shows a graph of the past 30 minutes of the parameters you checked off (See #1 below). Please note, this is not an interactive plot. You can no longer check any other boxes to add more variables after getting to this screen. In order to add or remove any parameters, you must click the “Reset Trend Monitor” button (See #2 below). This will bring you back to the original box.

If this plot is open for any length of time, you may see it updates according to any changes that occur to the chosen parameter(s).



Analyze Current Data in Position Data

To view an interactive graph of the chosen parameters, choose the “Analyze Current Data” button (See red arrow below). This button can be pressed while the Trend Monitor is either closed or open (See the 2 examples below).

New York

Position Data | Satellite Status | Range Data

Receiver ID:	31937	ID Hex:	7CC1
Time:	17:48:00 GMT	Wktime:	409695
Location:	wznywrsp1c1	City:	New York

<input checked="" type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1
<input checked="" type="checkbox"/> Sat Valid:	10	<input checked="" type="checkbox"/> Flag:	0
<input checked="" type="checkbox"/> HDOP:	1.245	<input type="checkbox"/> VDOP:	1.701
<input type="checkbox"/> HPL:	13.496	<input checked="" type="checkbox"/> VPL:	20.267
<input type="checkbox"/> Geo Stream:	133	<input type="checkbox"/> Up Error:	0.657
<input type="checkbox"/> East Error:	0.242	<input type="checkbox"/> North Error:	0.405

View the past 30 minutes

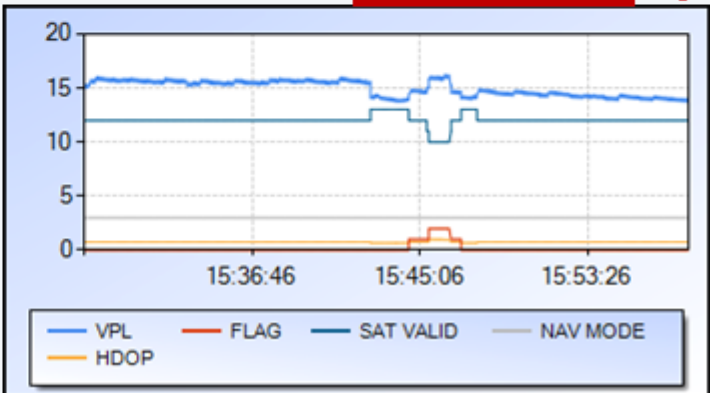
New York

Position Data | Satellite Status | Range Data

Receiver ID:	31937	ID Hex:	7CC1
Time:	15:58:28 GMT	Wktime:	403123
Location:	wznywrsp1c1	City:	New York

<input checked="" type="checkbox"/> Nav Mode:	3	<input type="checkbox"/> Nav Status:	1
<input checked="" type="checkbox"/> Sat Valid:	12	<input checked="" type="checkbox"/> Flag:	0
<input checked="" type="checkbox"/> HDOP:	0.739	<input type="checkbox"/> VDOP:	1.101
<input type="checkbox"/> HPL:	9.843	<input checked="" type="checkbox"/> VPL:	13.883
<input type="checkbox"/> Geo Stream:	133	<input type="checkbox"/> Up Error:	0.778
<input type="checkbox"/> East Error:	0.015	<input type="checkbox"/> North Error:	0.939

View the past 30 minutes



— VPL — FLAG — SAT VALID — NAV MODE
— HDOP

Analyze Current Data in Internet Explorer

In Internet Explorer, once you press the “Analyze Current Data” button, the interactive Range Analysis window will open showing the parameters you had checked off in the Position Data dialog box (See thick red arrow below). Here, you are able to add and take away different parameters using the buttons at the top of the screen. (See #1 below) Press the “Create Position Analysis” box to see the changes you made (See #2 below). For more information on how this differs in Chrome, please go to the “Receiver Analysis Mode in Chrome/Firefox” section on page 45 of this user guide.

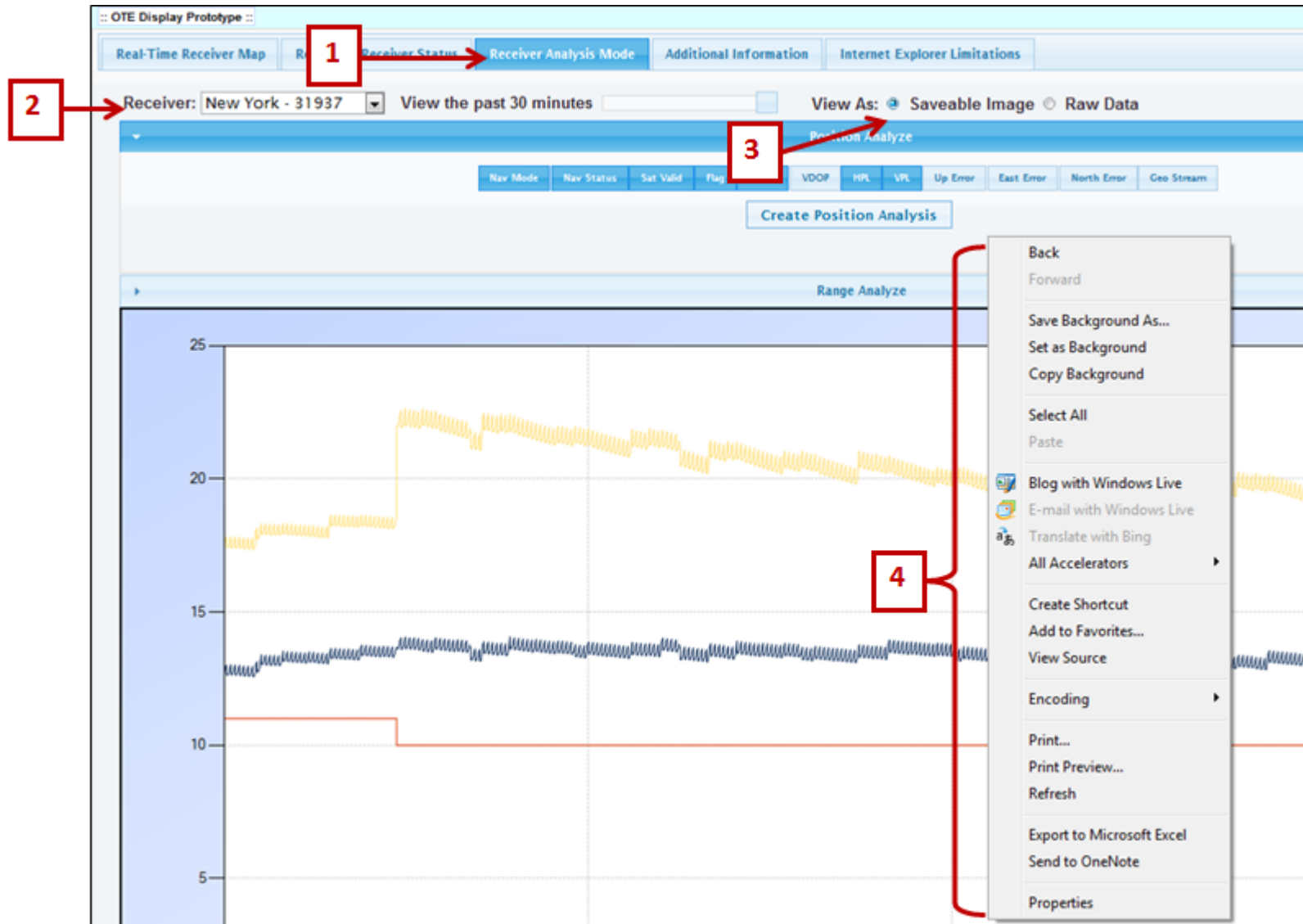


The figure below shows what the plot looks like *after* adding Nav Status and HPL.



Notice the tab that is open is now the “Receiver Analysis Mode” tab (See #1 below).

The receiver you are viewing the data for is listed on the upper left corner. In this case, it is New York -31937 (See #2 below). Also, the time is still the amount of time we asked to see initially. #3 below also shows us that we are viewing this as a saveable image. If you would like to save this image, copy it, etc., right click anywhere on the screen (See #4 below). To view the data in tabular form, click on the Raw Data button.



Here is the same data viewed as a table in Raw Data (See #1 below).

#2 shows you can move through all pages using “Page Controls.” Use the down arrow next to “Results Per Page” to increase or decrease the amount of results you wish to view. “Page #” allows you to type in the page you would like to view. You may also “Save the data as a Comma Separated Value File. (.csv)”

#3 show the time in GPS time. These are the number of seconds since the GPS epoch of January 6, 1980.

The screenshot displays the 'Receiver Analysis Mode' interface for 'New York - 31937'. The 'View As' dropdown is set to 'Raw Data'. The 'Range Analyze' section shows 'Page Controls' with navigation buttons, 'Results per Page' set to 10, 'Page #' set to 1/181, and a 'Save as Comma Separated Value File' link. The data table below has columns for GPS TIME, NAV_MODE, NAV_STATUS, SAT_VALID, FLAG, HDOP, HPL, and VPL. The first row of data shows GPS TIME as 1075743180.

GPS TIME	NAV_MODE	NAV_STATUS	SAT_VALID	FLAG	HDOP	HPL	VPL
1075743180	3	1	11	0	1	12.7710	17.5760
1075743181	3	1	11	0	1	12.8750	17.6910
1075743182	3	1	11	0	1	13.0040	17.8340
1075743183	3	1	11	0	1	12.6370	17.4270
1075743184	3	1	11	0	1	12.6280	17.4360
1075743185	3	1	11	0	1	12.68	17.4780
1075743186	3	1	11	0	1	12.7580	17.5660
1075743187	3	1	11	0	1	12.8630	17.6820
1075743188	3	1	11	0	1	13.0250	17.8240
1075743189	3	1	11	0	1	12.6570	17.4180

Satellite Status Tab

The Satellite Status Tab

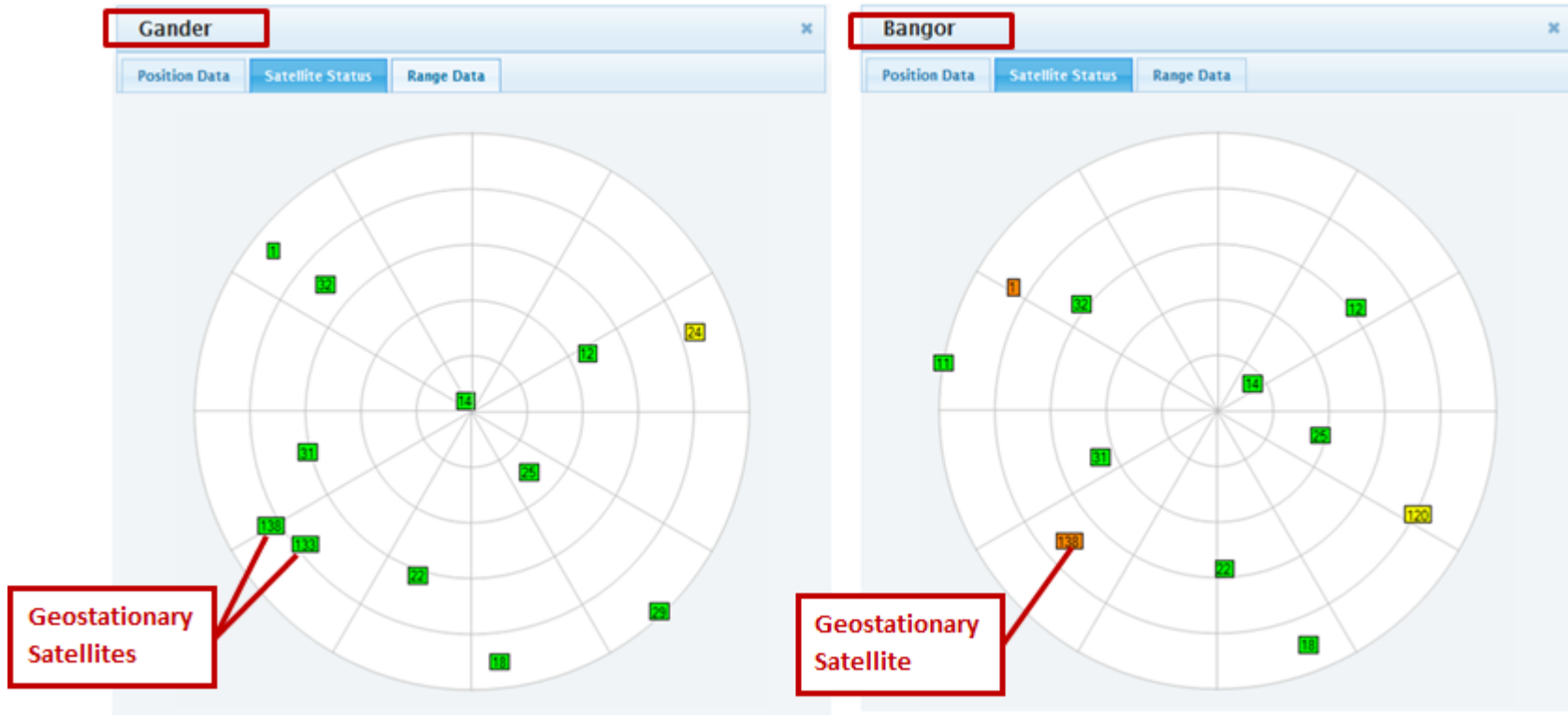
Clicking on the “Satellite Status” Tab brings up a Polar Plot showing the receiver and the location of the satellites. (See below) The receiver is at the center of the plot. The satellites are again shown here as colored boxes. The color of the satellite indicates whether the predetermined parameters are being met (green) or if one or more variables are exceeding the threshold (yellow, orange, red). The satellite’s PRN number is inside each box.

The Geostationary satellites:

Each receiver is programmed to track different Geostationary satellites. Here, the New York satellite tracks #133, 135 and 138.

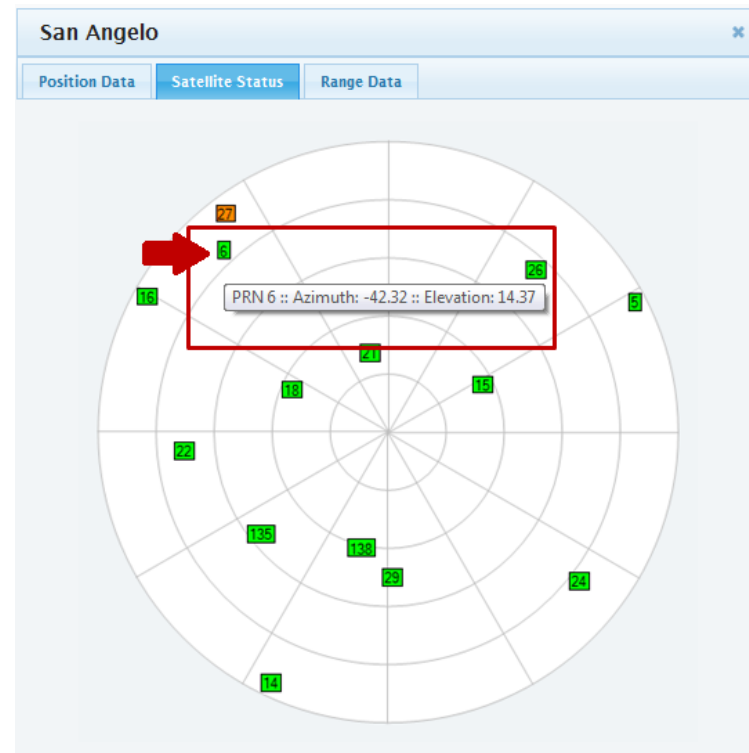
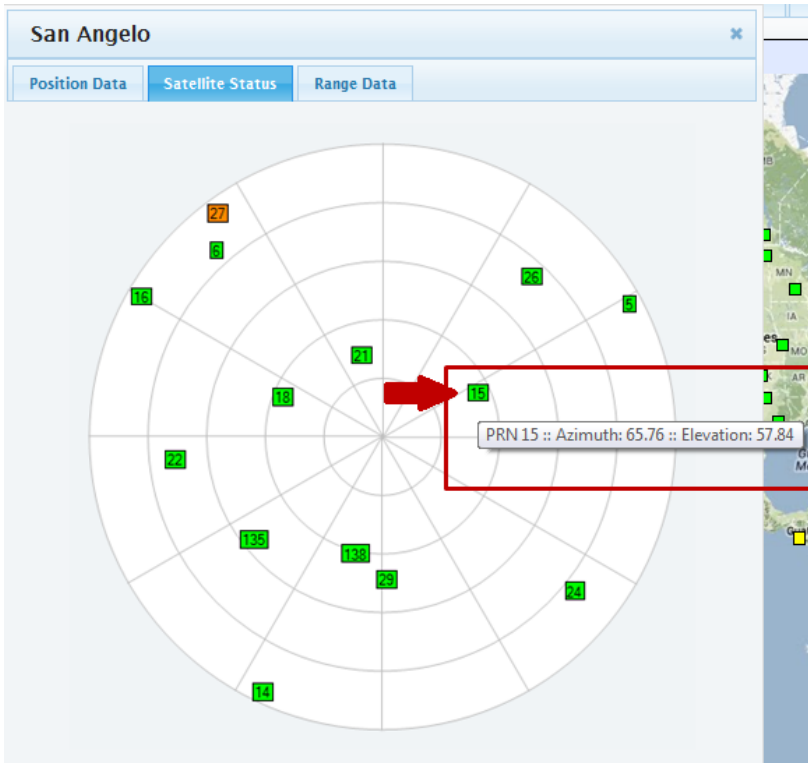


In contrast, the Gander receiver tracks only two WAAS Satellites, PRN #133 and 138. The Bangor receiver only tracks PRN #138. Satellite #120 in the Bangor polar plot is not tracked by WAAS. It is an EGNOS satellite, part of the European Satellite Based Augmentation System (SBAS). The Bangor site has an NSTB receiver that is not part of the WAAS.



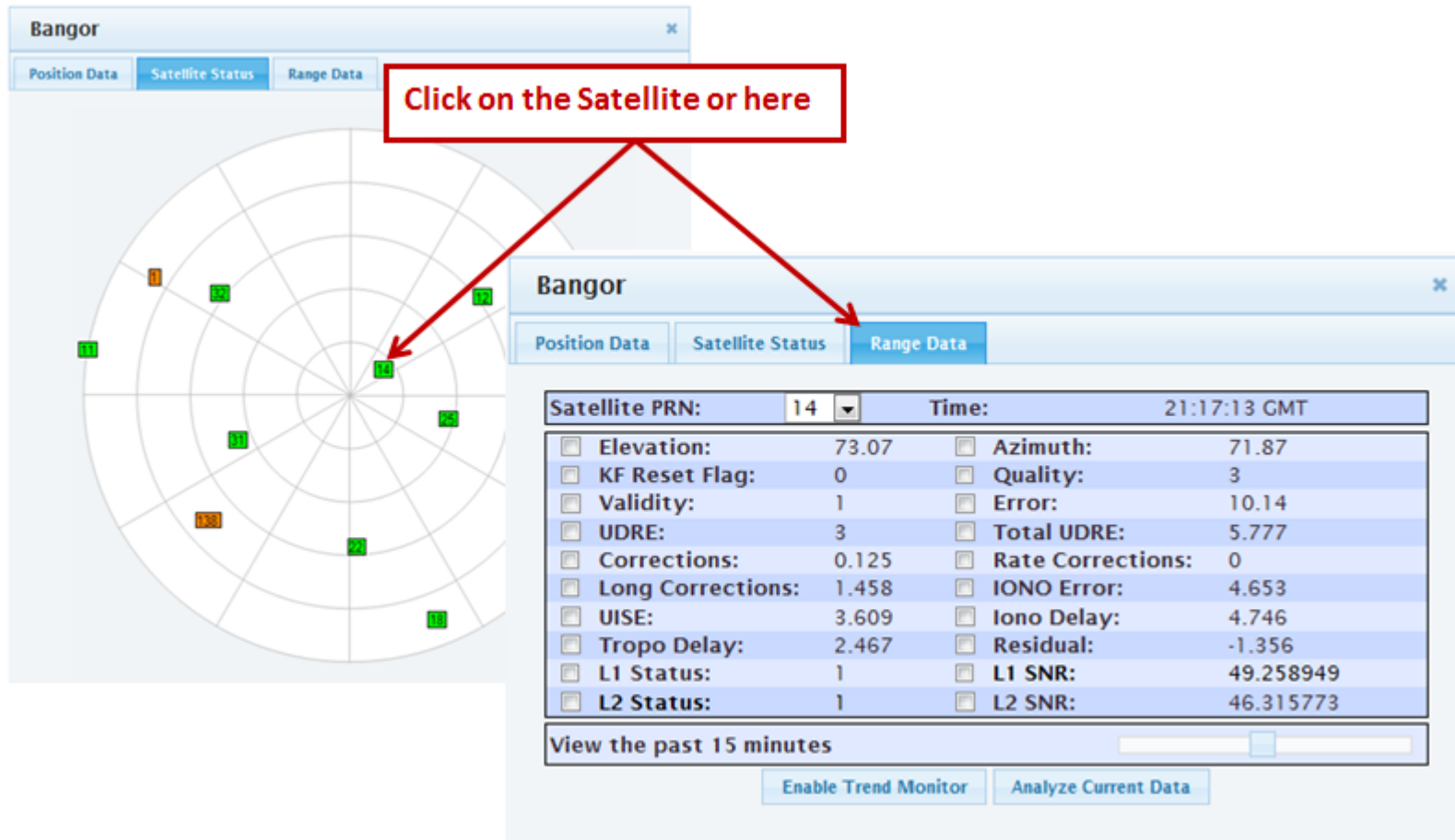
On a polar plot, the concentric circles show the elevation angle. The closer the circle is to the center/receiver, the higher the elevation of the satellite. Here, in relation to the San Angelo receiver, the elevation of PRN 15 is 57.84 degrees (See left side of figure below) while the elevation of PRN 6 is 14.37 degrees (See right side of figure below).

The lines radiating from the center show the azimuth of the satellite in degrees. Notice here the azimuth of PRN 15 is 65.76, while PRN 6 is -42.32.



In Satellite status view, you can click on any of the satellite to see information about that particular satellite. Doing so will open the dialog box in the “Range Data” tab view. You can also get here by going to the next tab labeled “Range Data” to see the same information. See below.

Please note: If the “Range Data” tab does not appear when selecting a satellite, refresh the browser using  in Chrome or  in Internet Explorer.



Bangor

Position Data Satellite Status Range Data

Click on the Satellite or here

Bangor

Position Data Satellite Status Range Data

Satellite PRN: 14 Time: 21:17:13 GMT

<input type="checkbox"/> Elevation:	73.07	<input type="checkbox"/> Azimuth:	71.87
<input type="checkbox"/> KF Reset Flag:	0	<input type="checkbox"/> Quality:	3
<input type="checkbox"/> Validity:	1	<input type="checkbox"/> Error:	10.14
<input type="checkbox"/> UDRE:	3	<input type="checkbox"/> Total UDRE:	5.777
<input type="checkbox"/> Corrections:	0.125	<input type="checkbox"/> Rate Corrections:	0
<input type="checkbox"/> Long Corrections:	1.458	<input type="checkbox"/> IONO Error:	4.653
<input type="checkbox"/> UISE:	3.609	<input type="checkbox"/> Iono Delay:	4.746
<input type="checkbox"/> Tropo Delay:	2.467	<input type="checkbox"/> Residual:	-1.356
<input type="checkbox"/> L1 Status:	1	<input type="checkbox"/> L1 SNR:	49.258949
<input type="checkbox"/> L2 Status:	1	<input type="checkbox"/> L2 SNR:	46.315773

View the past 15 minutes

Enable Trend Monitor Analyze Current Data

Range Data Tab

When you click on the range data tab or the satellite, the dialog box shows us our satellite number and GMT time. You can also switch to another Satellite using the down arrow next to "Satellite PRN". Please note; however, this list will only provide satellites which are currently in view of the chosen receiver. In this case, we are observing the Bangor receiver (See #1 below). #2 below shows we are currently viewing date from the past 15 minutes. Since we are viewing this on Internet Explorer, we can change this sliding scale to show us up to 30 minutes. (In Chrome or Firefox, your range extends to 60 minutes.)The definitions highlighted by the red boxes are defined below.

Elevation is the satellite elevation in degrees (0-90).
KF Reset Flag is used in calculation (0=not used, 1=used)
Validity: Range Error used in Position Solution (1=yes, 0=no).
UDRE is the indexed WAAS User Differential Range Error in meters.
Corrections are the WAAS Fast Corrections in meters.
Long Corrections are the WAAS Long Corrections in meters.
UISE stands for User Ionospheric Slant Error in meters.
Tropo Delay is the Slant Tropospheric Delay in meters.
L1 Status and L2 Status is the receiver Signal Data Flag (1=valid, 0=invalid)

1

2

Bangor	
Range Data	
Satellite PRN:	15
Time:	15:47:50 GMT
Elevation:	87.38
KF Reset Flag:	0
Validity:	1
UDRE:	3
Corrections:	0
Long Corrections:	1.061
UISE:	3.4
Tropo Delay:	2.362
L1 Status:	1
L2 Status:	1
Azimuth:	112.88
Quality:	3
Error:	6.294
Total UDRE:	5.83
Rate Corrections:	0.021
IONO Error:	4.165
Iono Delay:	3.858
Residual:	-0.187
L1 SNR:	51.27924
L2 SNR:	49.352921

View the past 15 minutes

Enable Trend Monitor Analyze Current Data

Bangor

Position Data Satellite Status Range Data

Satellite PRN: 15 Time: 15:47:50 GMT

Elevation:	87.38	Azimuth:	112.88
KF Reset Flag:	0	Quality:	3
Validity:	1	Error:	6.294
UDRE:	3	Total UDRE:	5.83
Corrections:	0	Rate Corrections:	0.021
Long Corrections:	1.061	IONO Error:	4.165
UISE:	3.4	Iono Delay:	3.858
Tropo Delay:	2.362	Residual:	-0.187
L1 Status:	1	L1 SNR:	51.27924
L2 Status:	1	L2 SNR:	49.352921

View the past 15 minutes

Enable Trend Monitor Analyze Current Data

Azimuth is the Satellite Azimuth in degrees (0 - +/-180).
Quality is the Supported Operating Mode (0=invalid, 1=SPS, 2=NPA, 3=PA).
Error is Range Error to Satellite or Estimate – Truth in meters.
Total UDRE shows Total User Differential Range Error in meters.
Rate Corrections are WAAS Clock Corrections in meters.
IONO Error is Ionospheric Error or Estimate – Truth in meters.
Iono Delay is the Ionospheric Delay in meters.
Residual is the Navigation Solution Range Residual.
L1 SNR and L2 SNR is the Signal to Noise ratio in decibels.

Enable Trend Monitor in the Range Data Tab

Just like in the Position data tab, in Range Data you can monitor the performance of parameters you want to view by marking the checkboxes and clicking the “Enable Trend Monitor” dialog box.

The screenshot shows the 'Bangor' software interface with the 'Range Data' tab selected. The interface displays a table of satellite parameters for PRN 6 at 17:41:17 GMT. The 'Elevation' and 'Azimuth' parameters are checked. A red arrow points to the 'Enable Trend Monitor' button.

Parameter	Value	Checked
Elevation:	0.81	<input checked="" type="checkbox"/>
KF Reset Flag:	0	<input type="checkbox"/>
Validity:	0	<input type="checkbox"/>
UDRE:	3	<input type="checkbox"/>
Corrections:	0	<input type="checkbox"/>
Long Corrections:	1.369	<input type="checkbox"/>
UISE:	9.478	<input type="checkbox"/>
Tropo Delay:	0	<input type="checkbox"/>
L1 Status:	1	<input type="checkbox"/>
L2 Status:	0	<input type="checkbox"/>
Azimuth:	-84.46	<input checked="" type="checkbox"/>
Quality:	0	<input type="checkbox"/>
Error:	66.159	<input type="checkbox"/>
Total UDRE:	4.395	<input type="checkbox"/>
Rate Corrections:	-0.063	<input type="checkbox"/>
IONO Error:	2.073	<input checked="" type="checkbox"/>
Iono Delay:	16.774	<input type="checkbox"/>
Residual:	0	<input type="checkbox"/>
L1 SNR:	32.212505	<input type="checkbox"/>
L2 SNR:	31.696732	<input type="checkbox"/>

View the past 30 minutes

Enable Trend Monitor

Once you click the “Enable Trend Monitor” box, it shows a graph of the past 30 minutes of the parameters you checked off (See #1 below). This is not an interactive plot. You can no longer check any other boxes to add more variables after getting to this screen. In order to add or remove any checked boxes, you must click the “Reset Trend Monitor” button (See #2 below). This will bring you back to the original box such as the one shown above.

If this plot is open for any length of time, you may see it does update according to any changes that occur to the chosen parameter(s).

Bangor

Position Data | Satellite Status | **Range Data**

Satellite PRN: 6 | Time: 17:39:10 GMT

<input checked="" type="checkbox"/> Elevation:	1.29	<input checked="" type="checkbox"/> Azimuth:	-83.75
<input type="checkbox"/> KF Reset Flag:	0	<input type="checkbox"/> Quality:	0
<input type="checkbox"/> Validity:	0	<input type="checkbox"/> Error:	15.275
<input type="checkbox"/> UDRE:	3	<input type="checkbox"/> Total UDRE:	21.644
<input type="checkbox"/> Corrections:	0.125	<input type="checkbox"/> Rate Corrections:	0
<input type="checkbox"/> Long Corrections:	1.369	<input checked="" type="checkbox"/> IONO Error:	4.839
<input type="checkbox"/> UISE:	21.883	<input type="checkbox"/> Iono Delay:	16.547
<input type="checkbox"/> Tropo Delay:	47.17	<input type="checkbox"/> Residual:	0
<input type="checkbox"/> L1 Status:	0	<input type="checkbox"/> L1 SNR:	32.027649
<input type="checkbox"/> L2 Status:	0	<input type="checkbox"/> L2 SNR:	28.634501

View the past 30 minutes

2 → **Reset Trend Monitor** | Analyze Current Data

1 →

Legend: IONO ERROR, AZIMUTH, ELEV

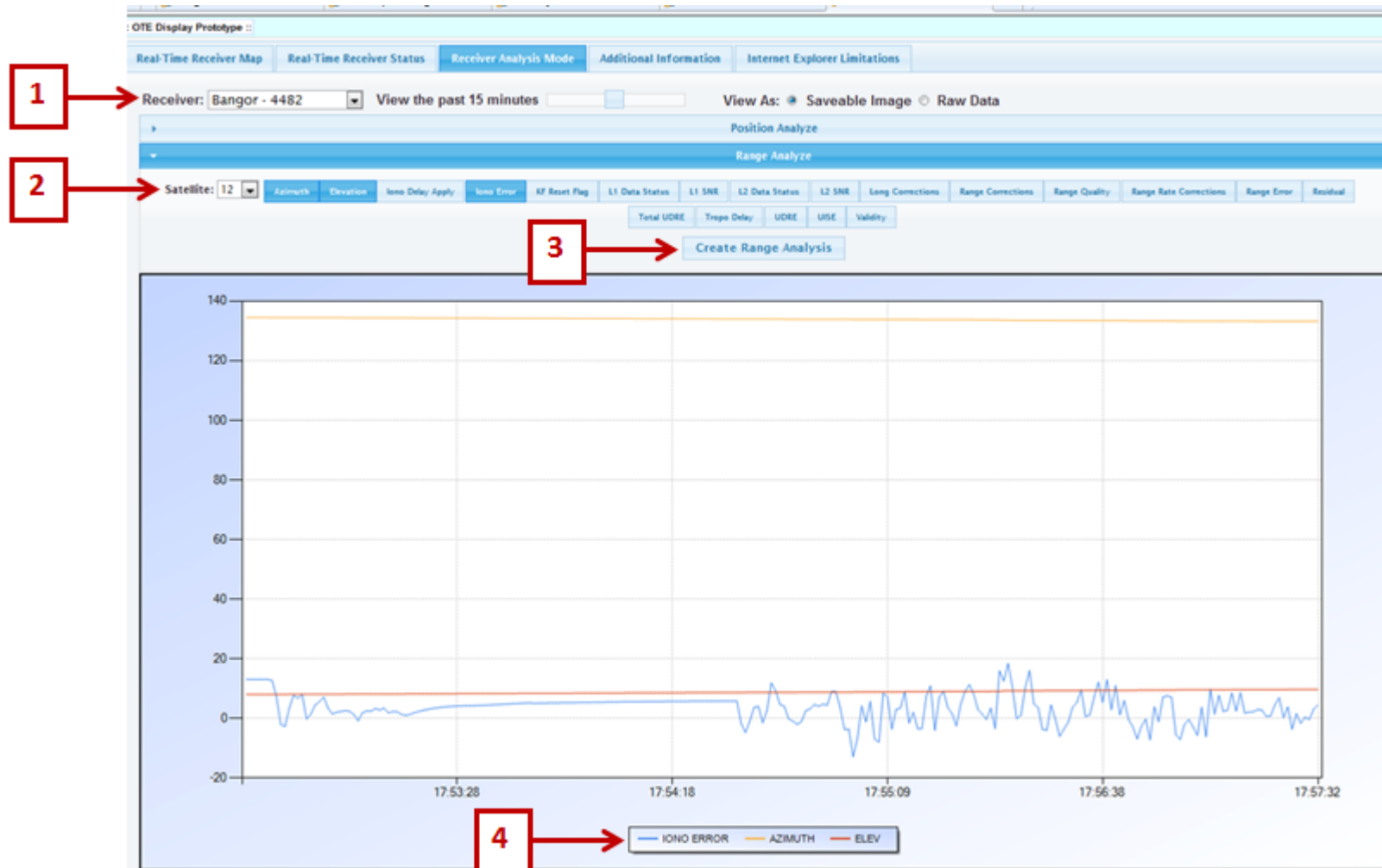
Analyze Current Data in Range Data Tab

With the parameters you want to view checked, click on the “Analyze Current Data” button to open a new window (See below). This button can be pressed when Trend Monitor is either open or unopened.

The screenshot shows the 'Bangor' software interface. At the top, there is a window title 'Bangor' with a close button. Below it is a tab bar with three tabs: 'Position Data', 'Satellite Status', and 'Range Data'. The 'Range Data' tab is selected. Below the tabs is a header section with 'Satellite PRN: 14' and 'Time: 17:51:44 GMT'. Below this is a table of satellite parameters with checkboxes for each. The 'Elevation' checkbox is checked. Below the table is a slider control labeled 'View the past 15 minutes'. At the bottom, there are two buttons: 'Enable Trend Monitor' and 'Analyze Current Data'. A red arrow points to the 'Analyze Current Data' button.

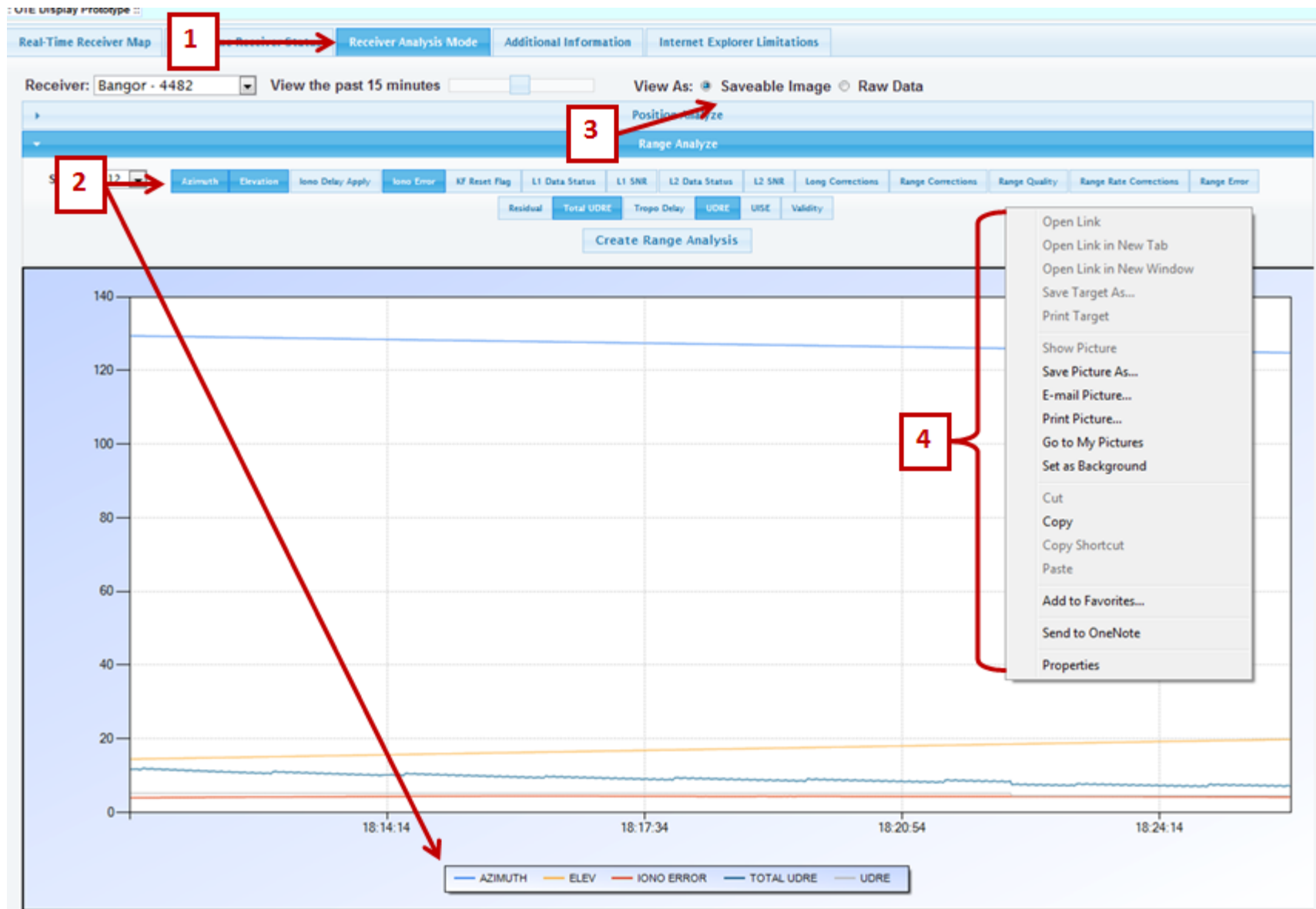
Parameter	Value	Parameter	Value
<input checked="" type="checkbox"/> Elevation:	28.98	<input checked="" type="checkbox"/> Azimuth:	-101.47
<input type="checkbox"/> KF Reset Flag:	0	<input type="checkbox"/> Quality:	3
<input type="checkbox"/> Validity:	1	<input type="checkbox"/> Error:	12.424
<input type="checkbox"/> UDRE:	3	<input type="checkbox"/> Total UDRE:	6.417
<input type="checkbox"/> Corrections:	0.125	<input type="checkbox"/> Rate Corrections:	-0.021
<input type="checkbox"/> Long Corrections:	1.658	<input checked="" type="checkbox"/> IONO Error:	4.622
<input type="checkbox"/> UISE:	6.917	<input type="checkbox"/> Iono Delay:	8.237
<input type="checkbox"/> Tropo Delay:	4.857	<input type="checkbox"/> Residual:	1.263
<input type="checkbox"/> L1 Status:	1	<input type="checkbox"/> L1 SNR:	45.482475
<input type="checkbox"/> L2 Status:	1	<input type="checkbox"/> L2 SNR:	35.965816

The resulting window opens an interactive window. Note, the receiver number and the amount of time viewed at the top of the window (See #1 below). Here, the Range Analysis Mode window is showing the parameters you had checked off in the Range Data dialog box. To add and take away different parameters, use the buttons at the top of the screen (See #2 below). You then press the “Create Position Analysis box to see the changes you made (#3 below). Note, #4 below is showing the initial parameters checked.



Notice, the tab that is open is the “Receiver Analysis Mode” tab (See #1 below).

The parameters you added are highlighted in blue at the top of the plot and also added to the key at the bottom of the graph (See #2 below). #3 also shows that you are viewing this as a saveable image. If you would like to save this image, copy it, etc., right click anywhere on the screen (See #4). To view the data in tabular form, click on the Raw Data button.



Here is the same data viewed as a table in **Raw Data** (See #1 below).

#2 shows you can move through all pages using **Page Controls**. Using the down arrow next to **Results Per Page** allows you to increase or decrease the amount of results you wish to view. **Page #** allows you to type in the page you would like to view. You may also save data using **Save as Comma Separated Value File (.csv)**

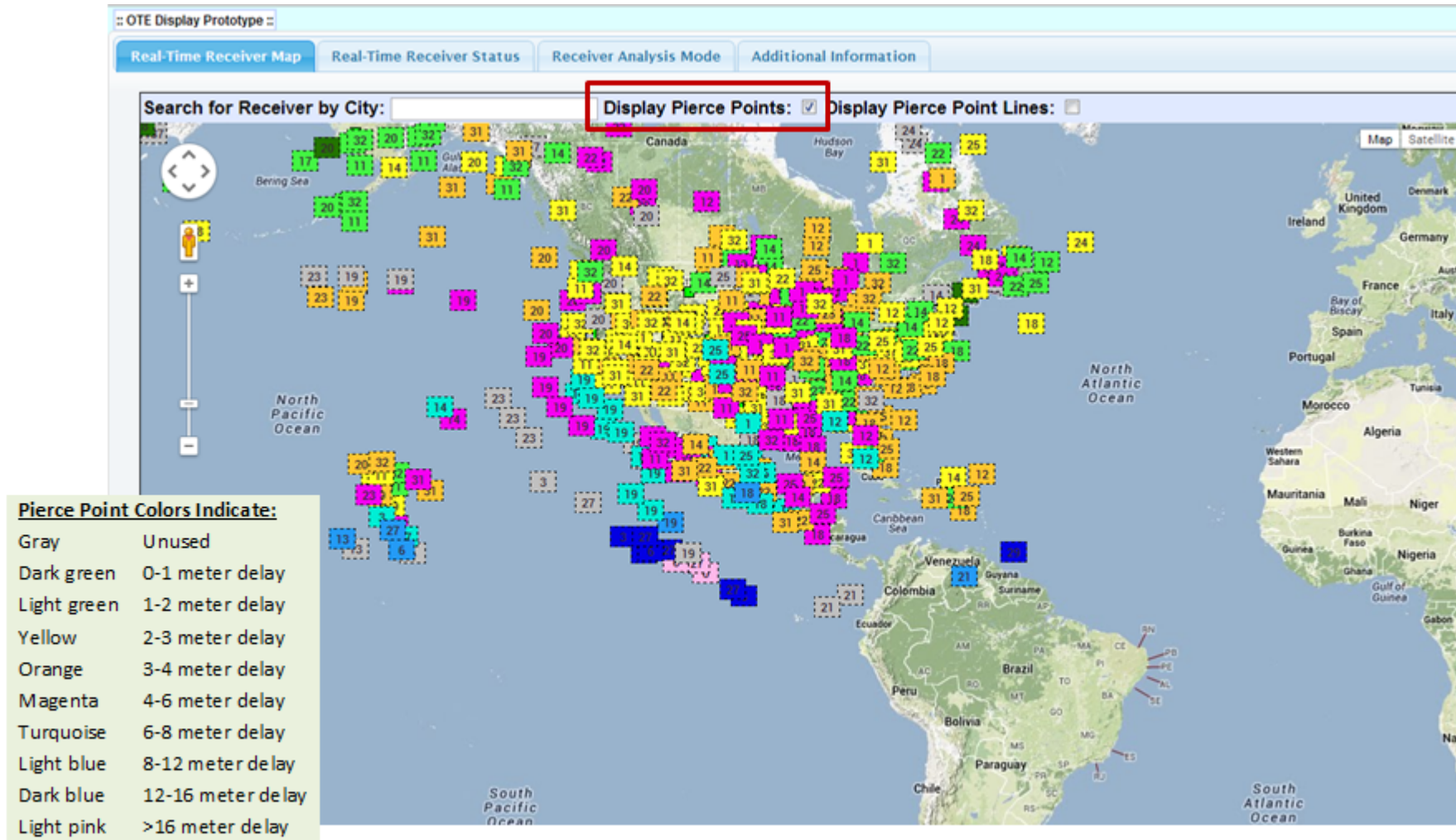
#3 shows time in GPS time. These are the number of seconds since the GPS epoch of January 6, 1980.

The screenshot shows the OTE Display Prototype interface. At the top, there are tabs for 'Real-Time Receiver Map', 'Real-Time Receiver Status', 'Receiver Analysis Mode', 'Additional Information', and 'Internet Explorer Limitations'. The 'Receiver Analysis Mode' tab is active. Below the tabs, the receiver is identified as 'Bangor - 4482'. A 'View the past 15 minutes' slider is present. The 'View As' section has radio buttons for 'Saveable Image' and 'Raw Data', with 'Raw Data' selected. A red box labeled '1' points to this selection. Below this, there are sections for 'Position Analyze' and 'Range Analyze'. The 'Range Analyze' section includes a 'Satellite' dropdown set to '12' and various analysis buttons like 'Azimuth', 'Elevation', 'iono Delay Apply', 'iono Error', 'KF Reset Flag', 'L1 Data Status', 'L1 SNR', 'L2 Data Status', 'L2 SNR', 'Long Corrections', 'Range Corrections', 'Range Quality', 'Range Rate Corrections', and 'Range Error'. There are also buttons for 'Residual', 'Total UDRE', 'Tropo Delay', 'UDRE', 'UISE', and 'Validity', along with a 'Create Range Analysis' button. A red box labeled '2' points to the 'Page Controls' area, which includes navigation icons, 'Results per Page: 10', 'Page # 1/91', and a 'Save as Comma Separated Value File' link. Below the controls is a table with the following data:

GPS TIME	AZIMUTH	ELEV	IONO_ERROR	TOTAL_UDRE	UDRE
1076177471	129.42	14.47	3.9690	11.7160	5.25
1076177472	129.42	14.48	3.9740	11.7160	5.25
1076177473	129.41	14.48	3.98	11.7260	5.25
1076177474	129.41	14.49	3.9850	11.7470	5.25
1076177475	129.40	14.49	3.9870	11.7780	5.25
1076177476	129.40	14.50	3.9940	11.8210	5.25
1076177477	129.39	14.51	3.9980	11.8250	5.25
1076177478	129.39	14.51	3.9980	11.8250	5.25
1076177479	129.38	14.52	4.0030	11.8360	5.25
1076177480	129.38	14.52	4.0070	11.9340	5.25

Pierce Points

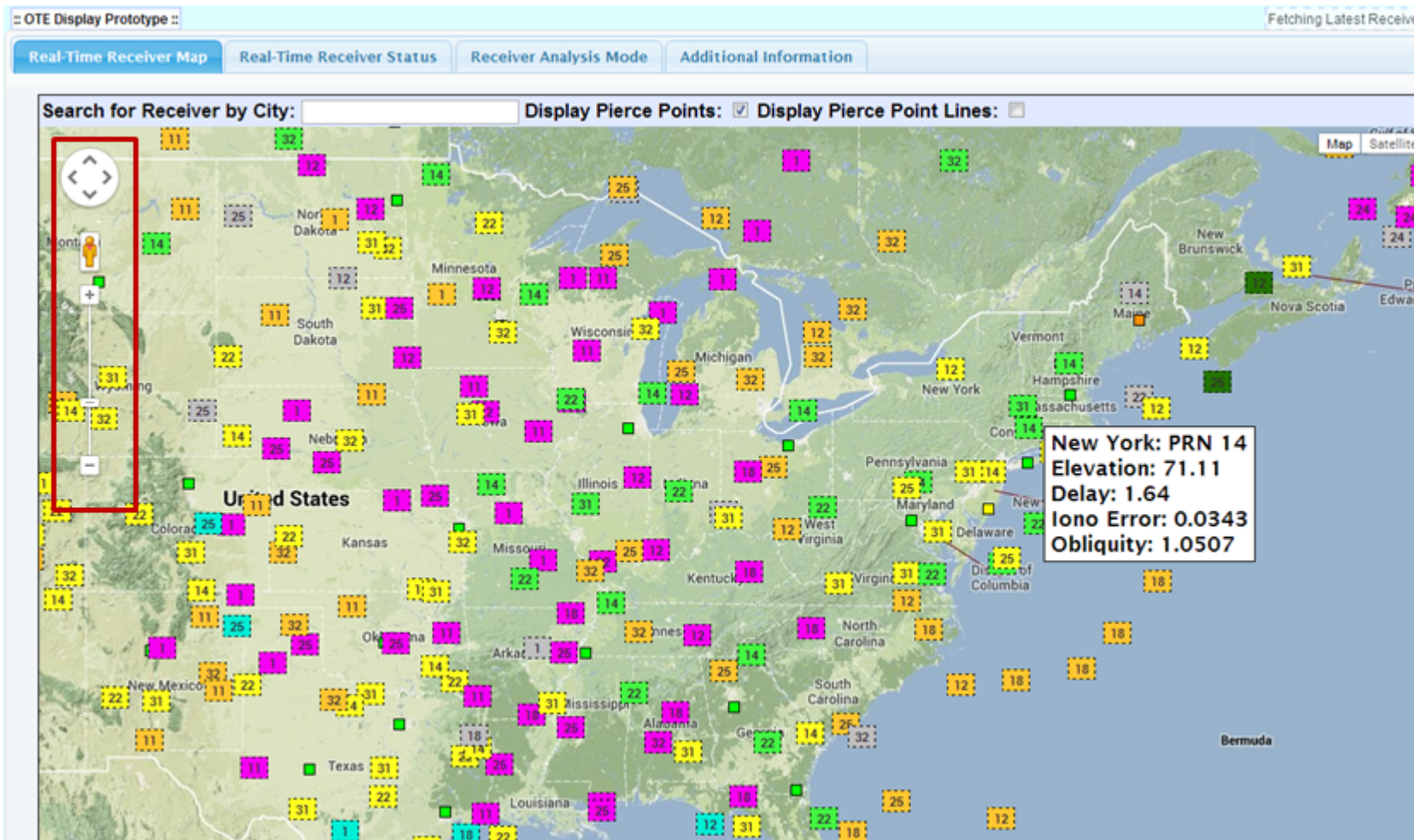
Only in Chrome and Firefox can you view Pierce Points, the place where the satellite signal pierces the ionosphere. To do so, check the box next to Display Pierce Points and it will look similar to the figure below. The pierce point colors correlate to the delay the ionosphere creates in meters (See inset below).



To get a closer look, you can zoom in using either the zoom control on the upper left corner of the map or the by scrolling with the scroll wheel on your computer mouse. You may also pan left/right/up/down using the Pan control or go to street view using Pegman, the little yellow person icon (See the red box below).

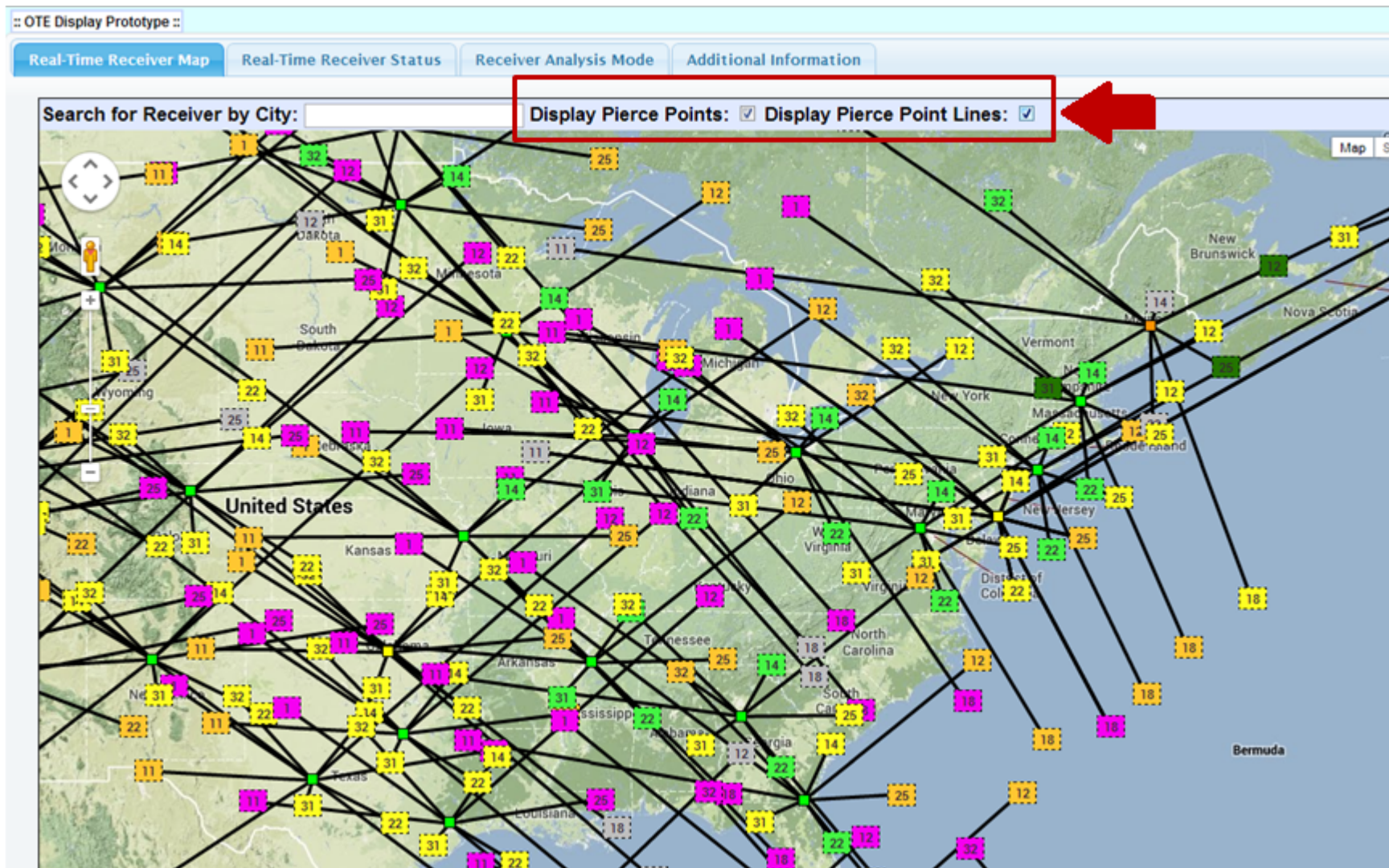
When we hovered over one of the boxes, a white box shows the Satellite PRN. Within the box are these parameters:

- The name of the city the receiver is in and the satellite number. Here, we see New York and Satellite PRN 14.
- **Elevation** is showing satellite elevation in degrees.
- **Delay** shows how much the ionosphere is delaying the GPS signal, in meters.
- **Iono Error** showing Ionospheric Error, or Estimate - Truth in meters.
- **Obliquity** is the factor that gives you the difference between the slant range and the distance of the satellite to the ground.



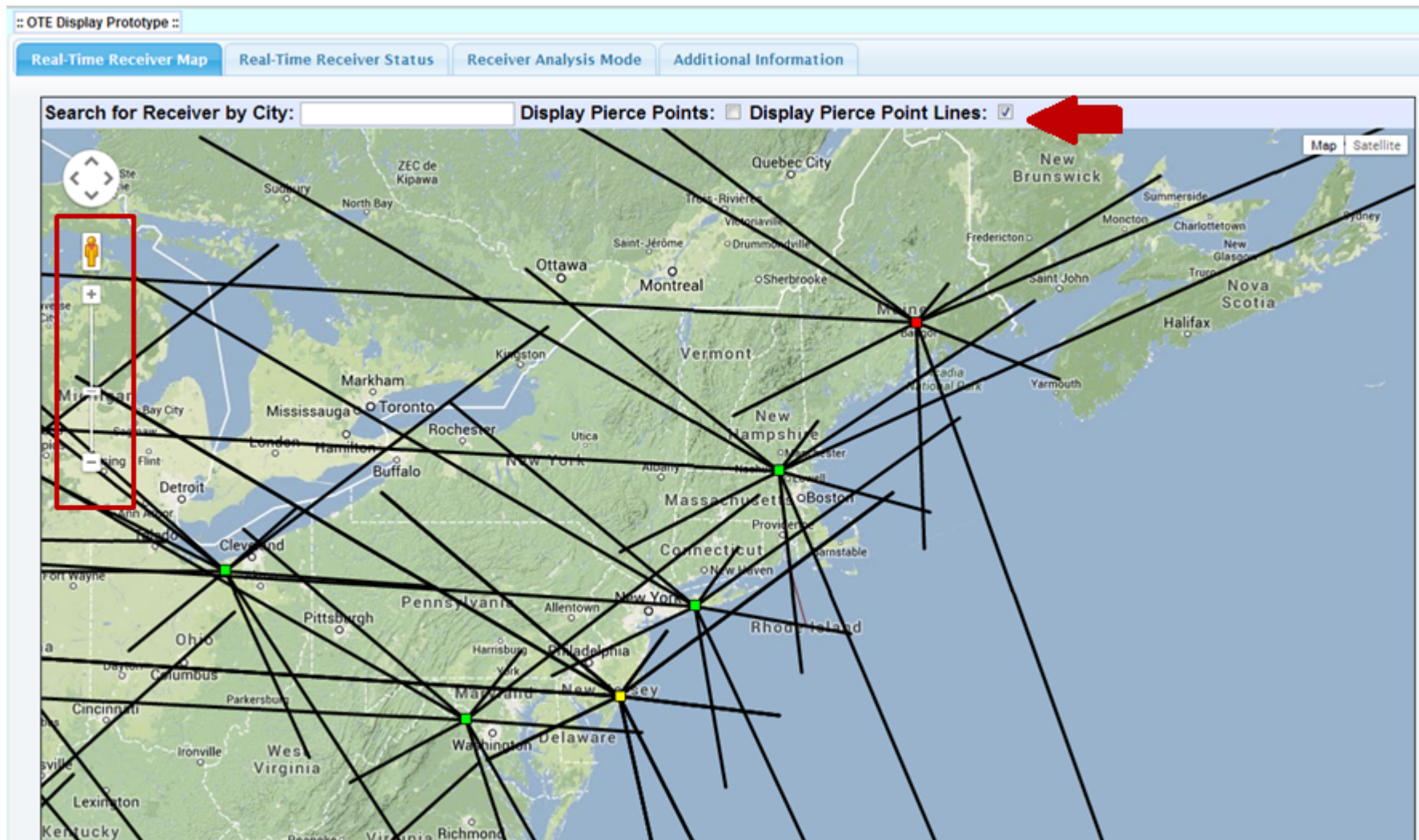
Pierce Points and Pierce Point Lines

Here is the same map displaying both pierce points and pierce point lines (See red arrow below). The black pierce point lines show the azimuth, or the direction of the satellite's location. Also, the length of the line corresponds to the elevation angle. The shorter the line is, the higher the elevation.



Pierce Point Lines

Here, only the Display Pierce Point Lines box is checked showing only the lines and receivers (See red arrow below). You may zoom in to get a closer look using the zoom control slider on the side in the red box. You may also use the scroll wheel on your mouse. As with all Google Maps, you can also use pan control or the Pegman, the little yellow person icon, for a street view.



Real Time Receiver Status

The Real-Time Receiver Status tab shows us a different way to look at data. Here, you will find a list-in alphabetical order- of all receivers from which we are obtaining data. If they are any color other than green, some parameter thresholds are being exceeded. The circle icon within each box indicates that range data is available.



To find out the position data of any of the receivers, click on the box you would like to view and the dialog box will open to the Position Data tab.

The red box and arrow are highlighting the dialog box connected to the receiver we clicked. In this case, we clicked on the Bangor receiver.

Notice the reason Bangor's box is yellow has to do with its Flag being 1 and the Up Error being -1.869.

The screenshot shows the 'OTE Display Prototype' interface with a grid of receiver status boxes. A dialog box for the 'Bangor' receiver is open, displaying position data and error metrics. A red box highlights the dialog box, and a red arrow points to the 'Bangor' box in the grid.

Receiver ID	ID Hex
4482	1182

Time	Wktime
15:39:31 GMT	315586

Location	City
Bangor	Bangor

<input type="checkbox"/> Nav Mode: 3	<input type="checkbox"/> Nav Status: 1
<input type="checkbox"/> Sat Valid: 10	<input type="checkbox"/> Flag: 1
<input type="checkbox"/> HDOP: 0.799	<input type="checkbox"/> VDOP: 1.169
<input type="checkbox"/> HPL: 10.626	<input type="checkbox"/> VPL: 14.905
<input type="checkbox"/> Geo Stream: 133	<input type="checkbox"/> Up Error: -1.869
<input type="checkbox"/> East Error: 3.459	<input type="checkbox"/> North Error: 0.468

View the past 15 minutes

Enable Trend Monitor Analyze Current Data

From here you can still use Trend Monitor and Analyze Current data. See arrow below:

The screenshot displays the 'OTE Display Prototype' software interface. At the top, there are navigation tabs: 'Real-Time Receiver Map', 'Real-Time Receiver Status', 'Receiver Analysis Mode', 'Additional Information', and 'Internet Explorer Limitations'. The 'Real-Time Receiver Status' tab is active, showing a grid of receiver status cards for various locations. A pop-up window for 'Bangor' (Receiver ID: 4482) is open, displaying detailed status information. A red arrow points to the 'Analyze Current Data' button in the pop-up window. Below this button is a line graph titled 'View the past 15 minutes' showing 'UP ERROR' (blue line) and 'FLAG' (orange line) over time. The graph shows the FLAG value fluctuating between 0 and 3, and the UP ERROR value fluctuating between -4 and 0.

Receiver ID	ID Hex	Time	Wktime	Location	City
4482	1182	15:45:31 GMT	315946	Bangor	Bangor

Nav Mode	Nav Status	Sat Valid	Flag	HDOP	VDOP	HPL	VPL	Geo Stream	Up Error	East Error	North Error
3	1	9	3	0.837	1.204	11.252	16.046	133	-2.912	3.497	1.262

UP ERROR	FLAG
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	0
2.5	0
2.0	0
1.5	0
1.0	0
0.5	0
0.0	0
-0.5	0
-1.0	0
-1.5	0
-2.0	0
-2.5	0
-3.0	0
-3.5	0
-4.0	0
-3.5	0
-3.0	0
-2.5	0
-2.0	0
-1.5	0
-1.0	0
-0.5	0
0.0	0
0.5	0
1.0	0

Receiver Analysis Mode

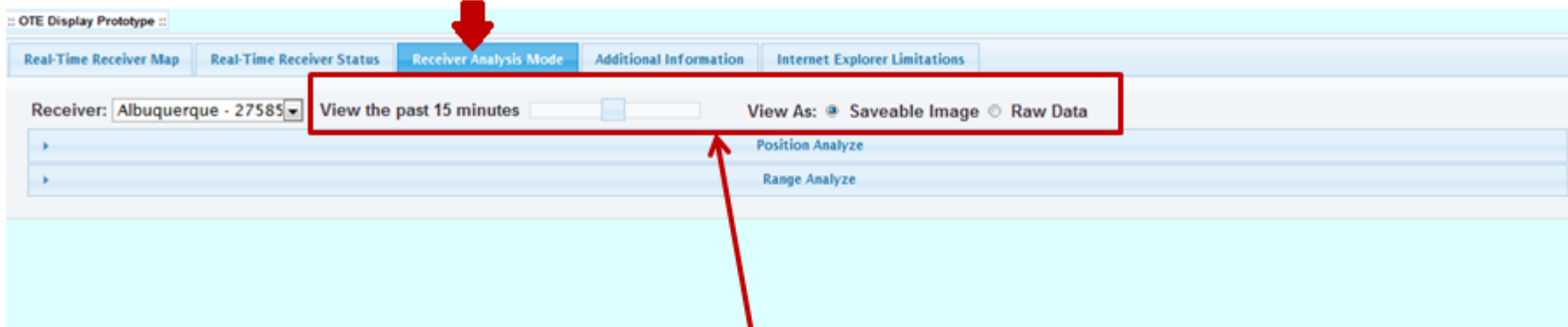
Clicking on the Receiver Analysis Mode tab brings you to Analysis Mode (See red arrows below). Please note that this screen looks different depending on the internet browser being used. Both allow you to choose the receiver, but the amount of time and how you can view the data varies.

In the top example, Internet Explorer allows you the same sliding scale of time as earlier, up to 30 minutes. You can also view the data as a saveable image or in table format by choosing Raw Data. In addition, in Internet Explorer only, there is a tab detailing the limitations of Internet Explorer.

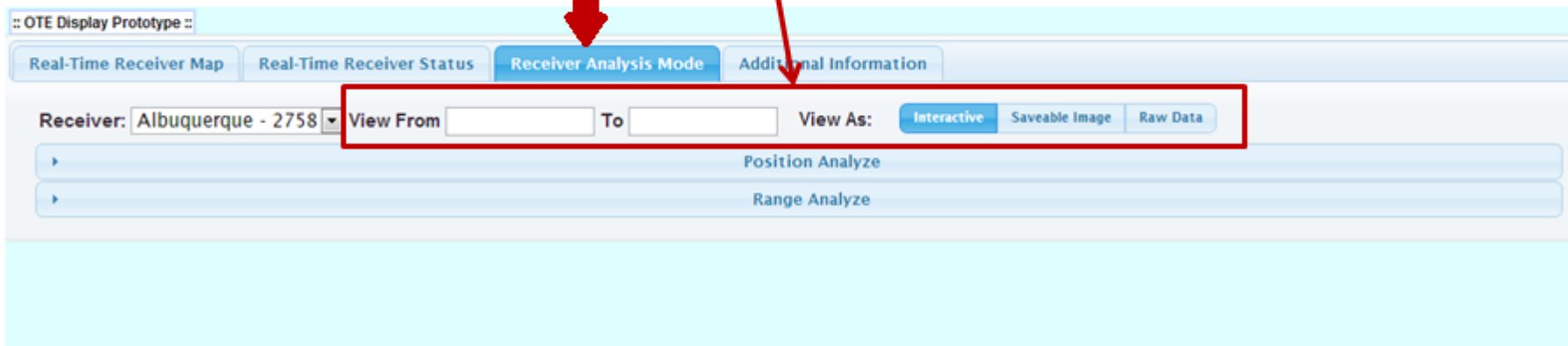
In contrast, Chrome, at the bottom of the image, gives you the option of inputting exact dates and time. Please note: you can only go back about four days, and –even then–you can only view 24 hours at a time anywhere within those four days. Once you input your dates, press the “Position Analyze” button or “Range Analyze” button, depending on what you want to view.

Please see image below to note the differences.

Receiver Analysis Mode in Internet Explorer:

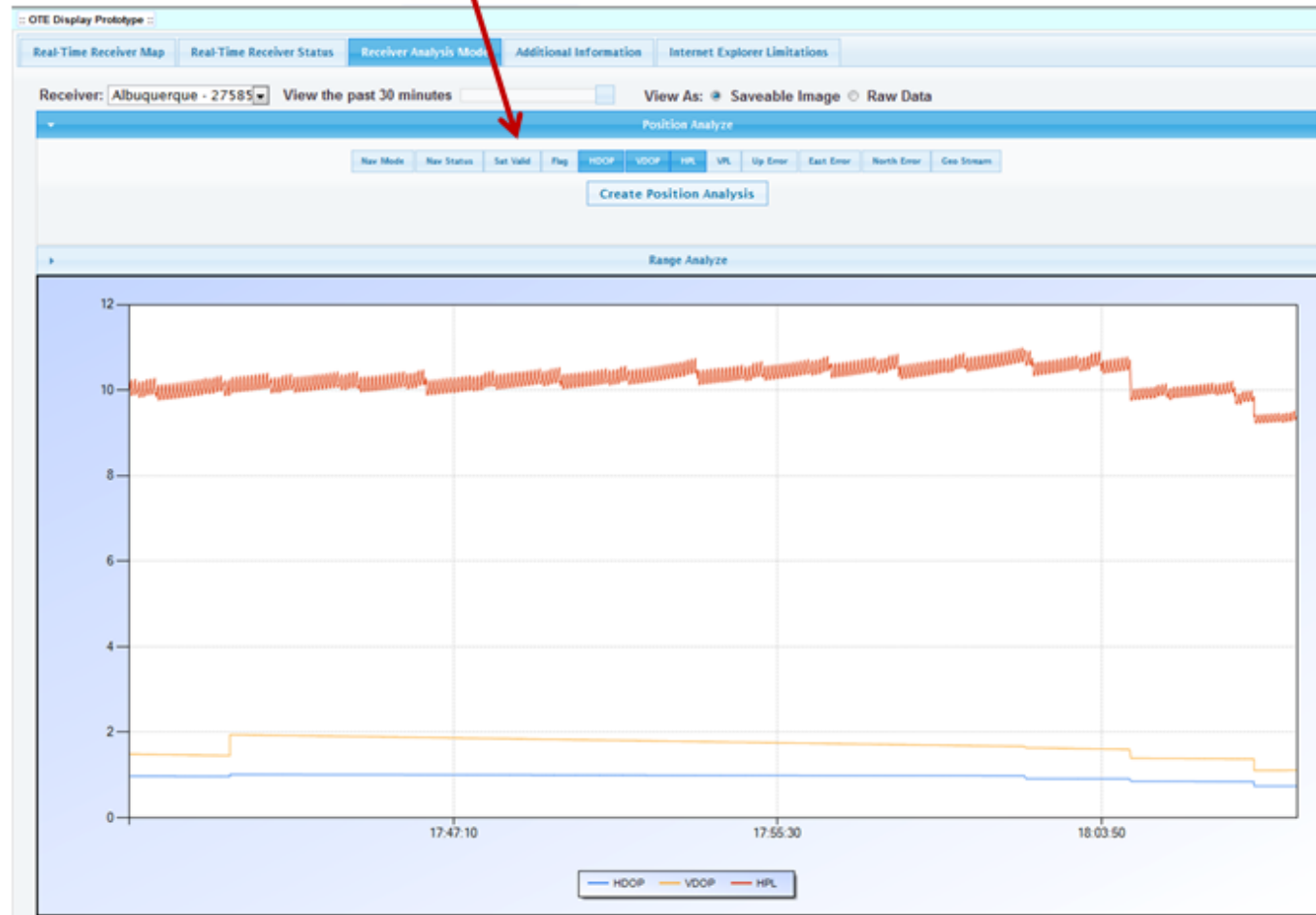
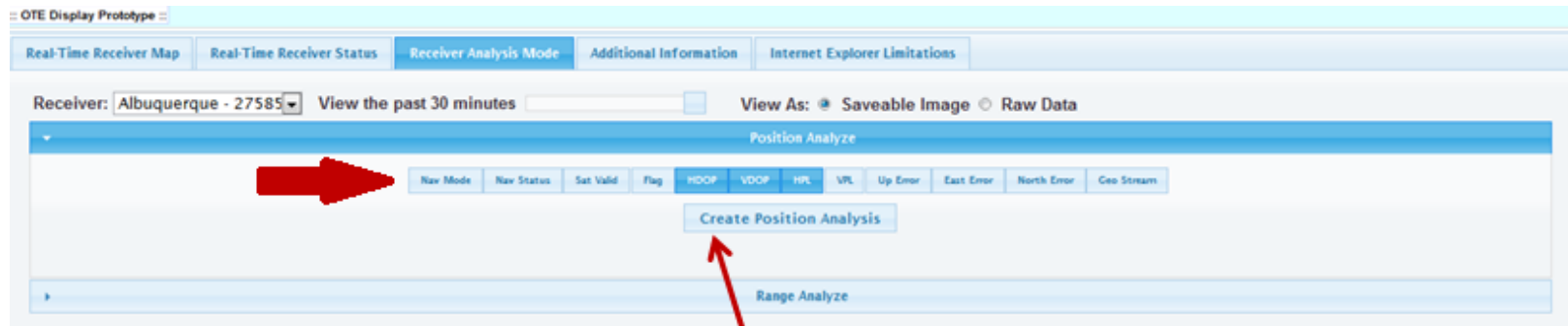


Receiver Analysis Mode in Chrome:



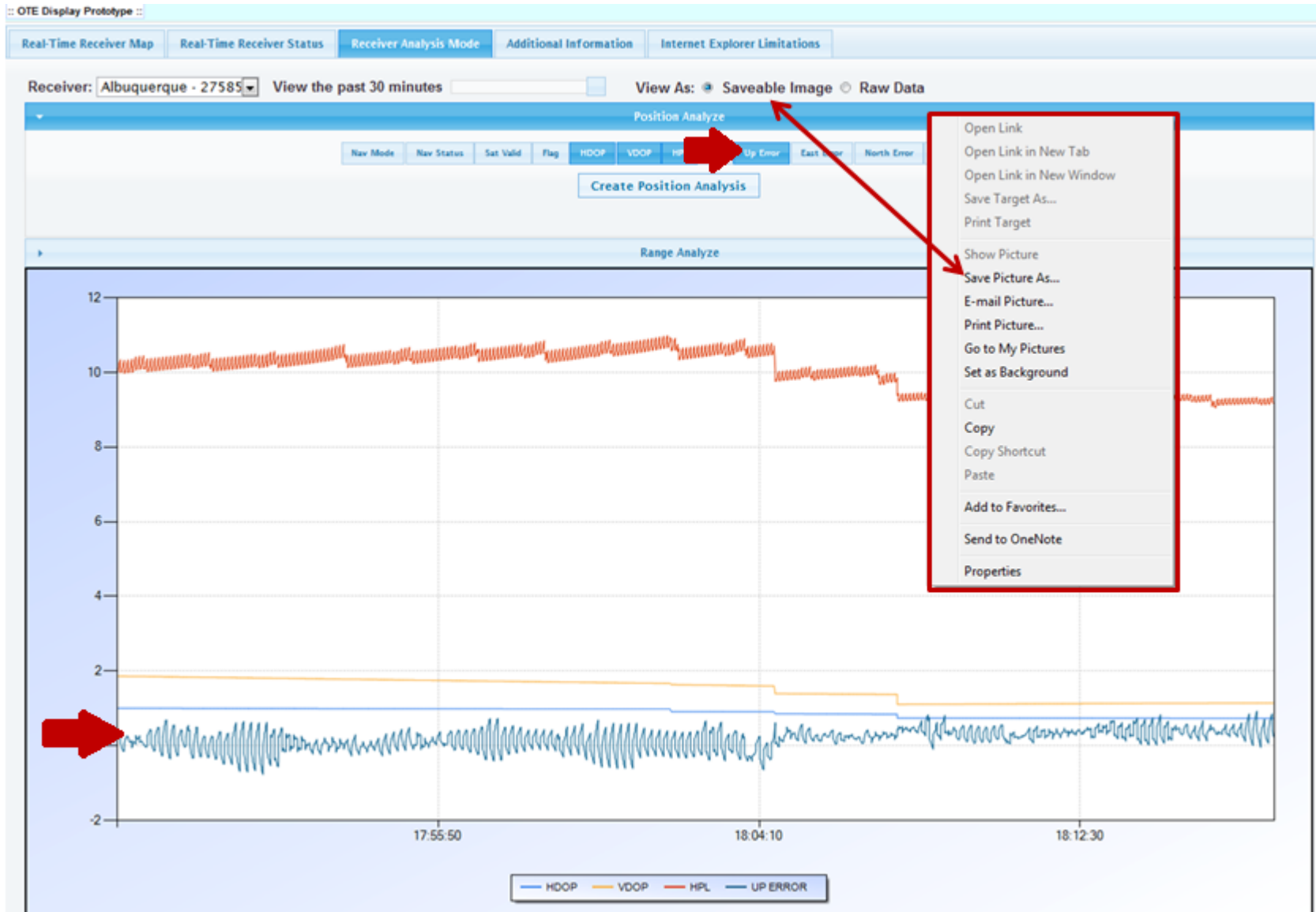
Receiver Analysis Mode in Internet Explorer (Position Analyze)

Once you press on the parameters you want to view (See thick arrow below) and click on “Create Position Analysis”, your results look similar to the graph at the bottom of the image below. In order to add variables to this graph, you can click on additional parameters, but you must re-click the “Create Position Analysis” button to view the additional information.



Internet Explorer Saveable Image (Position Analyze)

Below, the two thick red arrows show us that Up Error has been added to the graph. We are viewing the parameters as a saveable image. Right clicking on the graph brings up the dialog box that allows you to save, copy, email, etc. the image.



Internet Explorer Raw Data (Position Analyze)

Here is the same data for the Albuquerque receiver in **Raw Data** (#1 below). Note we are still in Position analysis.

#2 shows you can move through all pages using **Page Controls**. Using the down arrow next to “Results Per Page” allows you to increase or decrease the amount of results you wish to view. **Page #** allows you to type in the page you would like to view. You may also save data using “Save as Comma Separated Value File” (.cvs).

#3 shows time in GPS time. These are the number of seconds since the GPS epoch of January 6, 1980.

Receiver: Albuquerque - 27585 View the past 30 minutes View As: Saveable Image Raw Data

Position Analyze

Nav Mode Nav Status Sat Valid Flag HDOP VDOP HPL VPL Up Error East Error North Error Geo Stream

Create Position Analysis

Range Analyze

Page Controls: Results per Page: 10 Page # 1/181 Save as Comma Separated Value File

GPS TIME	HDOP	VDOP	HPL	UP_ERROR
1076262467	1.0020	1.8630	10.0070	0.2030
1076262468	1.0010	1.8630	10.0640	0.2320
1076262469	1.0010	1.8620	10.1430	0.2690
1076262470	1.0010	1.8620	10.2440	0.3060
1076262471	1.0010	1.8620	10.3410	0.2930
1076262472	1.0010	1.8620	9.9970	0.0610
1076262473	1.0010	1.8620	10.0210	-0.0510
1076262474	1.0010	1.8610	10.0780	-0.0830
1076262475	1.0010	1.8610	10.1570	-0.1170
1076262476	1.0010	1.8610	10.2270	-0.15

Internet Explorer Raw Data (Range Analyze)

Here, we are viewing the Raw Data within the Receiver Analysis Mode (See red arrow below). Range Analysis differs from Position Analysis, by giving us many different parameters to choose from (See the large, red box below).

Receiver: View the past 30 minutes View As: Saveable Image Raw Data

Position Analyze

Range Analyze

Satellite: Azimuth Elevation Iono Delay Apply Iono Error KF Reset Flag L1 Data Status L1 SNR L2 Data Status L2 SNR Long Corrections Range Corrections Range Quality Range Rate Corrections Range Error

Residual Total UDRE Tropo Delay UDRE UISE Validity

Create Range Analysis

Page Controls: Results per Page: Page # [Save as Comma Separated Value File](#)

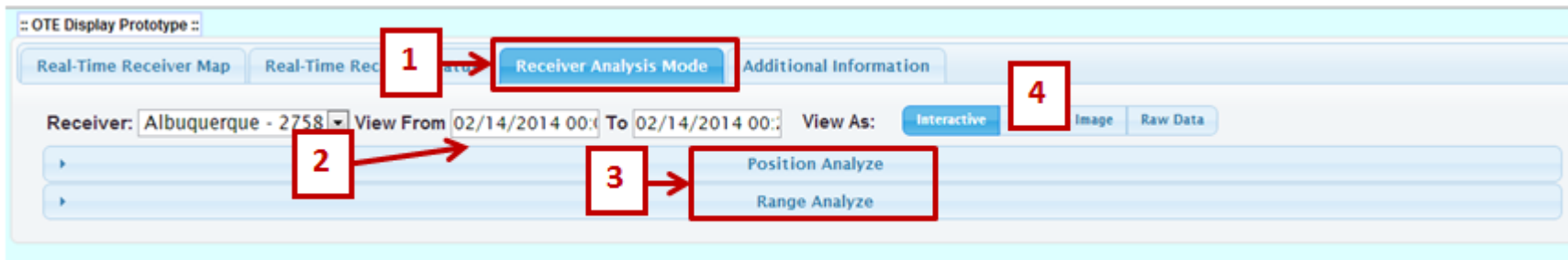
GPS TIME	HDOP	VDOP	HPL	UP_ERROR
1076262467	1.0020	1.8630	10.0070	0.2030
1076262468	1.0010	1.8630	10.0640	0.2320
1076262469	1.0010	1.8620	10.1430	0.2690
1076262470	1.0010	1.8620	10.2440	0.3060
1076262471	1.0010	1.8620	10.3410	0.2930
1076262472	1.0010	1.8620	9.9970	0.0610
1076262473	1.0010	1.8620	10.0210	-0.0510
1076262474	1.0010	1.8610	10.0780	-0.0830
1076262475	1.0010	1.8610	10.1570	-0.1170
1076262476	1.0010	1.8610	10.2270	-0.15

Receiver Analysis Mode in Chrome/Firefox

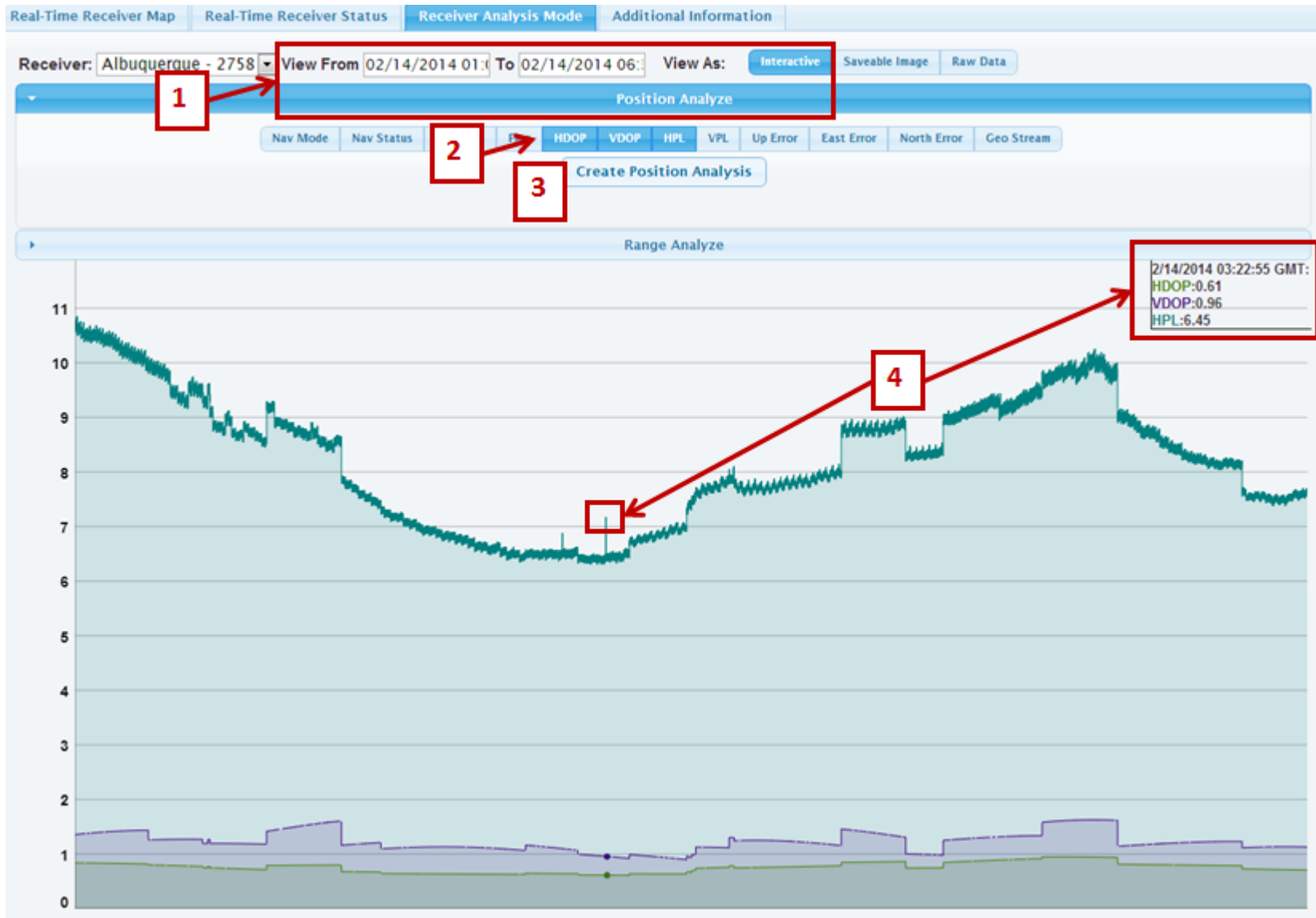
Here we are in Receiver Analysis Mode in Chrome (See #1 below). Notice that within Chrome (or Firefox), you have more options. Chrome gives you the option of inputting exact dates and time. Please note: you can only go back about four days, and you can view only 24 hours at a time anywhere within those four days (See #2 below).

Once you input your dates, press the “Position Analyze” button or “Range Analyze” button, depending on what you want to view (See #3 below).

The data is also interactive. Notice the interactive button (#4 below).

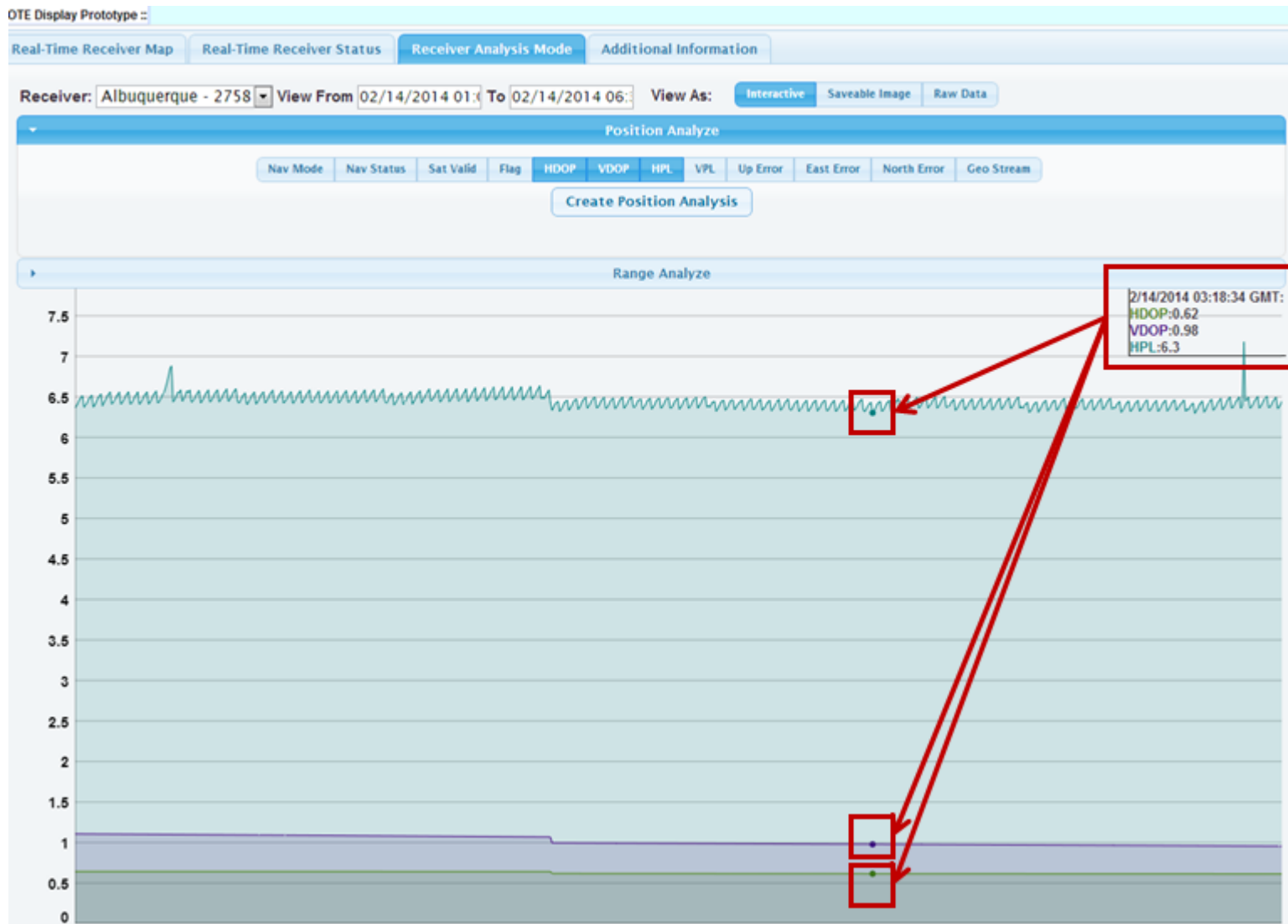


The figure below shows approximately 6 ½ hours of the Albuquerque receiver on 2/14/2014. We are in the interactive mode (See #1 below). The parameters we selected include HDOP, VDOP and HPL (See #2 below). Next, we clicked the “Create Position Analysis” box (See #3). #4 shows when we placed the cursor over the area highlighted by the small red box, the data for that given point shows up to the right of the area. The data in this box show the date and time in GMT along with the specific parameters of the items you chose at that exact point in time.



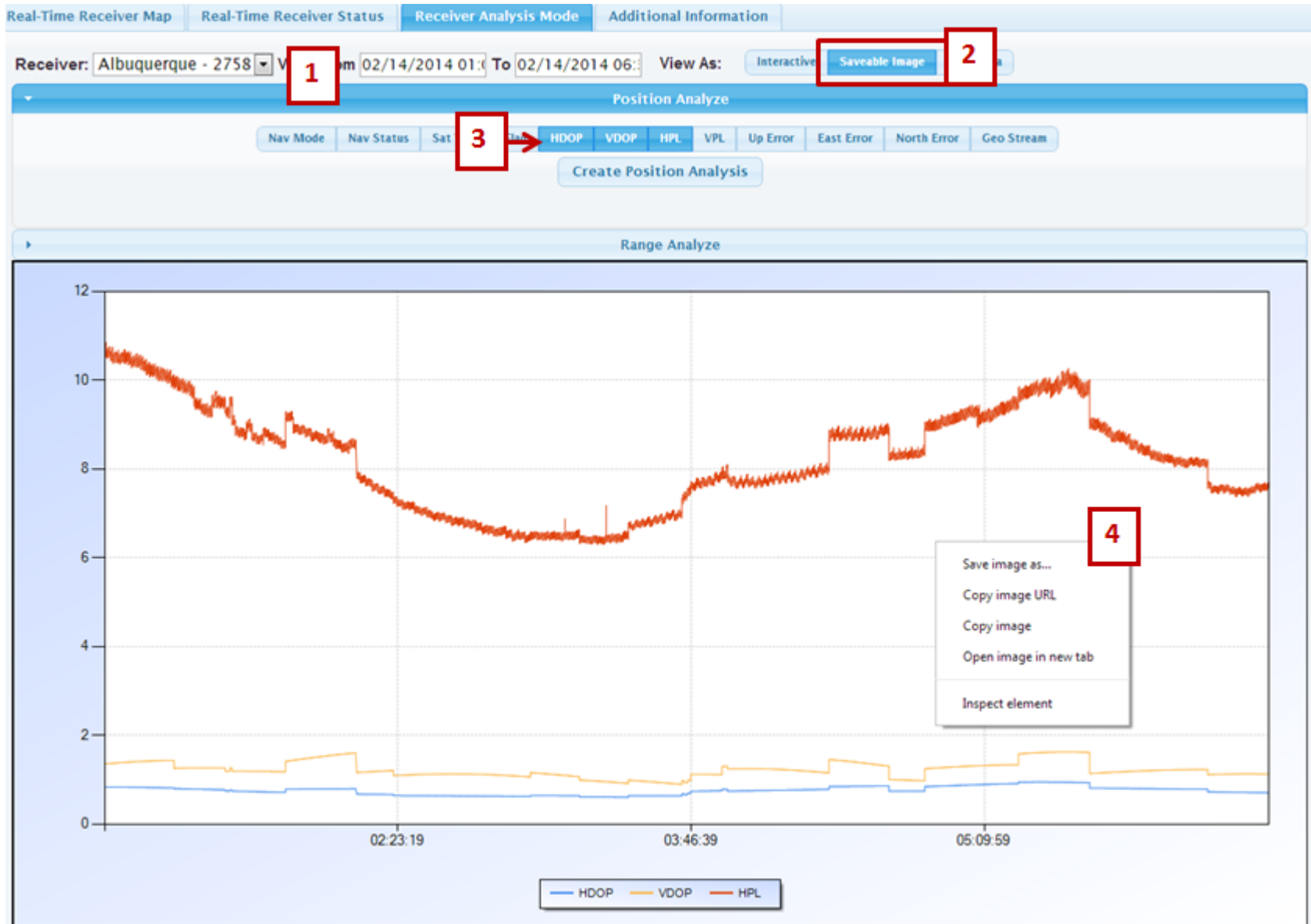
Chrome/Firefox Zoom (Position Analyze)

If you hold down your left mouse button and drag to create a box around a specific time in the graph, you can zoom in to the area you would like to view closer. Here is the Albuquerque receiver on the same day, but we zoomed in to look at 03:18:34 GMT, indicated by the small red boxes below. Here too, we have placed our cursor over a certain point in time which is indicated by the dots on each line in the graph. Notice the dots indicating an exact time. The parameters relating to those times are displayed inside the box at the top right of the screen.



Chrome/Firefox Saveable Image (Position Analyze)

Here we are in Chrome viewing the parameters as a “Saveable Image.” Notice: the date and time (See #1 below), the “Saveable Image” view (See #2 below), and the parameters that we have chosen (See #3 below). In Chrome, as in Internet Explorer, right click on the graph to bring up a dialog box that will allow you to save, copy or open the image (See #4 below).



Chrome/Firefox Raw Data (Position Analyze)

Here is the raw data for the same parameters in Chrome (See #1 below).

#2 shows you can move through all pages using Page Controls. Using the down arrow next to “Results Per Page” allows you to increase or decrease the amount of results you wish to view.” Page #” allows you to type in the page you would like to view. You may also save data using “Save as Comma Separated Value File (.csv).”

#3 shows time in GPS time. These are the number of seconds since the GPS epoch of January 6, 1980. Note: we are still in Position Analysis.

The screenshot displays the OTE Display Prototype interface. At the top, there are tabs for "Real-Time Receiver Map", "Real-Time Receiver Status", "Receiver Analysis Mode", and "Additional Information". The "Receiver Analysis Mode" tab is active. Below the tabs, the "Receiver" is set to "Albuquerque - 2758", and the "View From" and "To" dates are "02/14/2014 01:00" and "02/14/2014 06:00" respectively. The "View As" options are "Interactive", "Saveable Image", and "Raw Data", with "Raw Data" highlighted by a red box labeled "1".

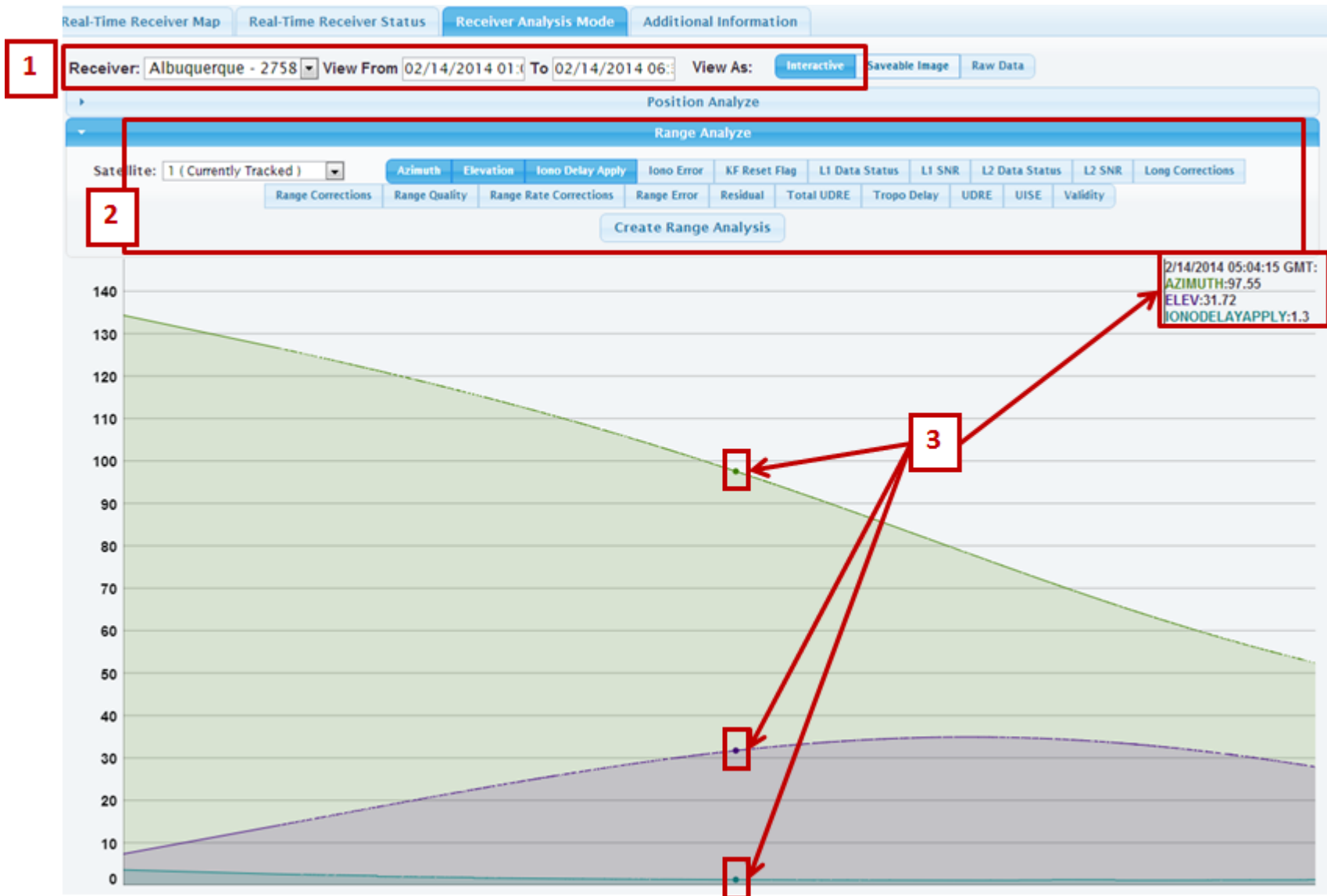
The "Position Analyze" section is visible, with a "Create Position Analysis" button. Below it, the "Range Analyze" section contains "Page Controls" (with navigation arrows), "Results per Page" (set to 10), "Page #" (set to 1/1987), and a "Save as Comma Separated Value File" link. This area is highlighted by a red box labeled "2".

The data table below has columns for "GPS TIME", "HDOP", "VDOP", and "HPL". The "GPS TIME" column header is highlighted by a red box labeled "3". The table contains 10 rows of data with the following values:

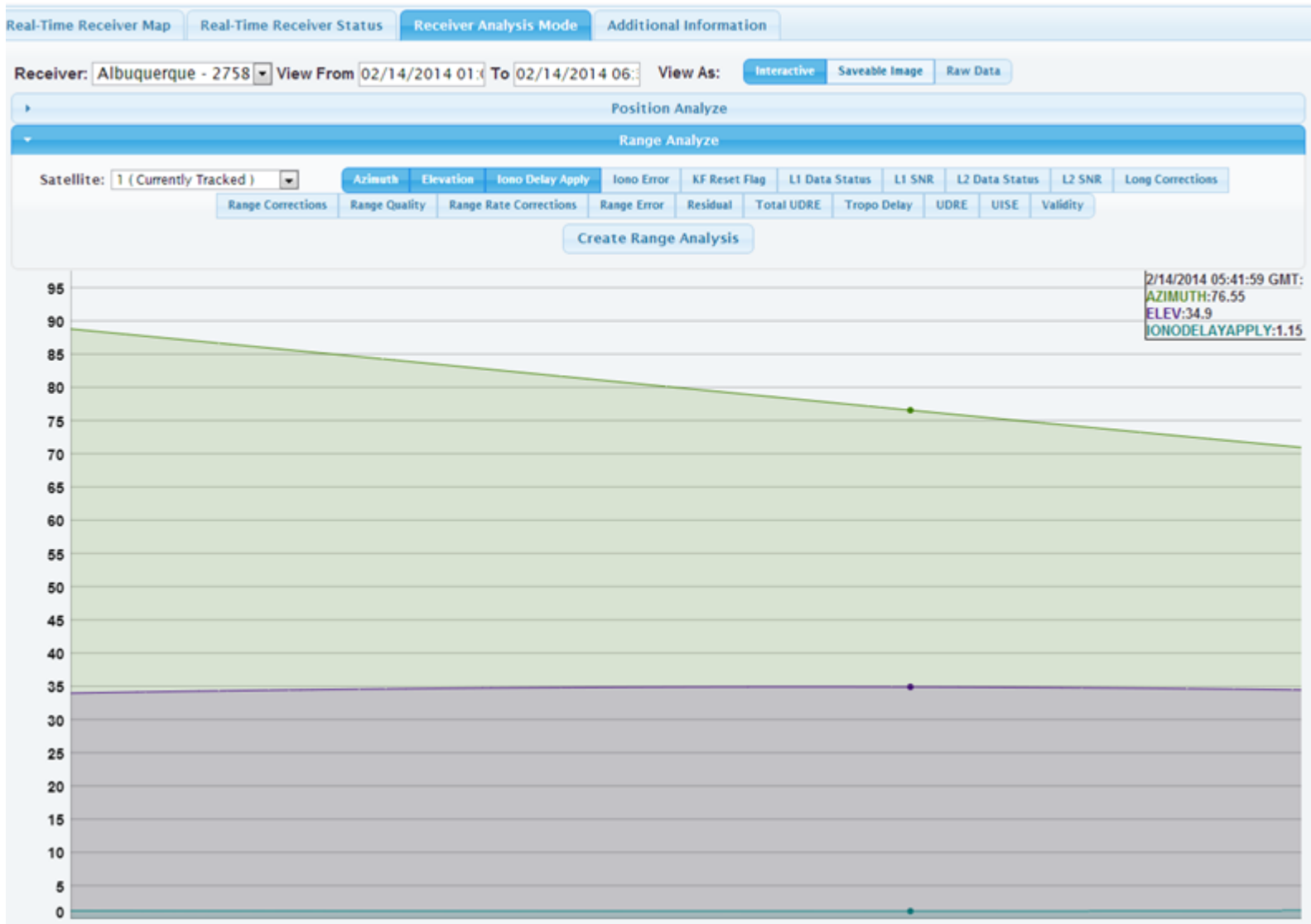
GPS TIME	HDOP	VDOP	HPL
1076374816	0.8390	1.3570	10.5540
1076374817	0.8390	1.3570	10.5970
1076374818	0.8390	1.3570	10.66
1076374819	0.8390	1.3580	10.7430
1076374820	0.8390	1.3580	10.7610
1076374821	0.8390	1.3580	10.7530
1076374822	0.8390	1.3580	10.5630
1076374823	0.8390	1.3580	10.6060
1076374824	0.8390	1.3580	10.6690
1076374825	0.8390	1.3580	10.7520

Chrome/Firefox Interactive Mode (Range Analyze)

Here, we are viewing the Range Analysis of the Albuquerque receiver within the same date and time in the Interactive view (See #1 below), except we have indicated Azimuth, Elevation and Iono Delay as our parameters (See #2 below). Here too, we have placed our cursor over a certain point in time which is indicated by the dots on each line in the graph. The exact date, time in GMT and parameters of Azimuth, Elevation and Iono Delay correlating to these dots is located in the box at the top right corner of the image (See #3 below).

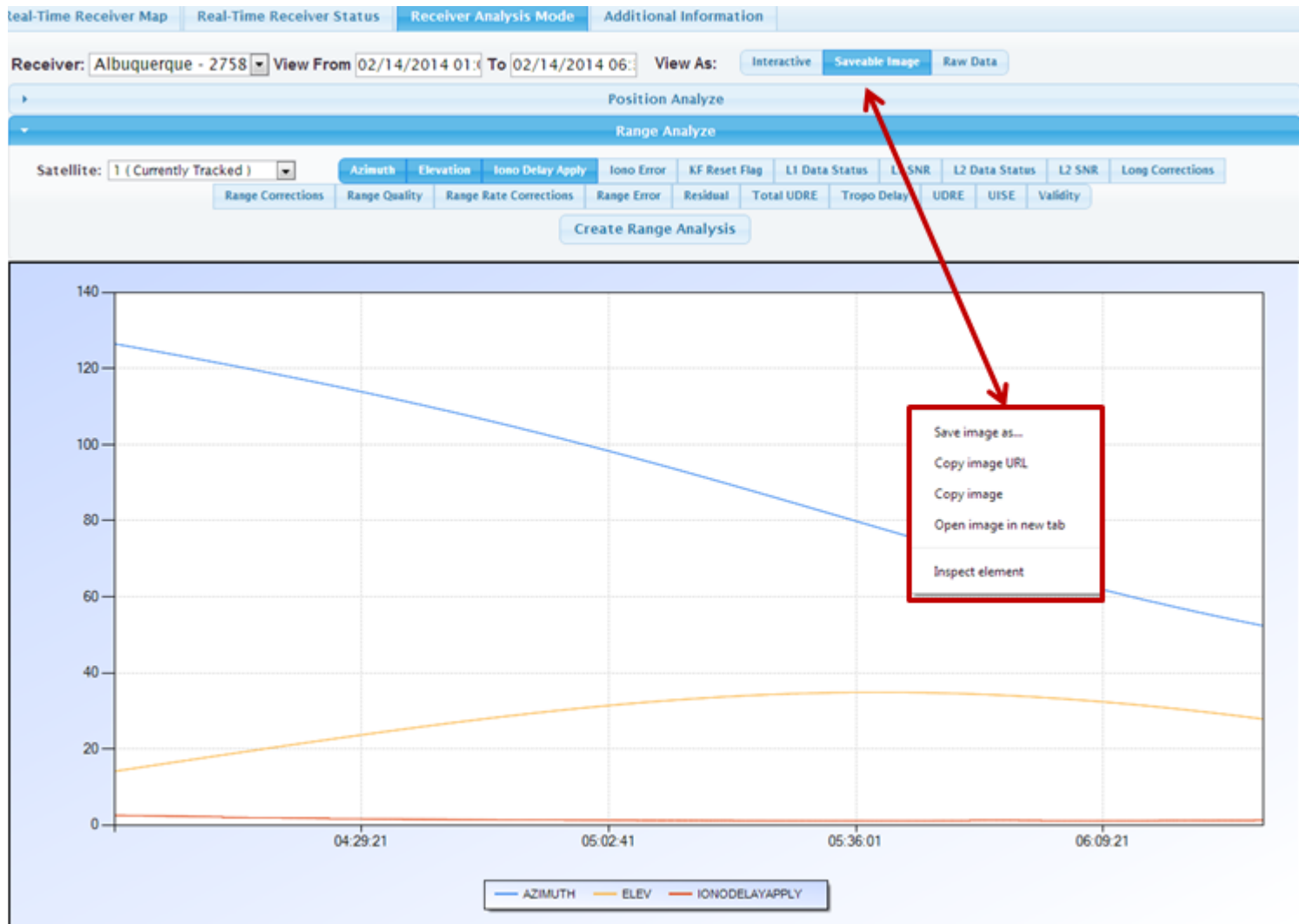


Because we are in Interactive Mode, we can zoom in closer within our range analysis of the same parameters: Azimuth, Elevation and Iono Delay.



Chrome/Firefox Saveable Image (Range Analyze)

Here is the Chrome image of the range analysis for the same parameters, except in saveable Mode. Again, we right-clicked here to open the dialog box that allows us to save, copy or open the image in a new tab.



Chrome/Firefox Raw Data (Range Analyze)

Here is the Chrome image of the range analysis for the same parameters, except in raw data (See #1 below). This looks just as it does in Chrome's Position Analysis.

#2 shows you can move through all pages using "Page Controls." Using the down arrow next to "Results Per Page" allows you to increase or decrease the amount of results you wish to view. "Page #" allows you to type in the page you would like to view. You may also save data using "Save as Comma Separated Value File (.cvs)."

#3 shows time in GPS time. These are the number of seconds since the GPS epoch of January 6, 1980.

Receiver: Albuquerque - 2758 View From 02/14/2014 01:00:00 To 02/14/2014 06:00:00 View As: Interactive Saveable Image **Raw Data** 1

Position Analyze

Range Analyze

Satellite: 1 (Currently Tracked) Azimuth Elevation Ion Delay Apply Ion Error KF Reset Flag L1 Data Status L1 SNR L2 Data Status L2 SNR Long Corrections

Range Corrections Range Quality Range Rate Corrections Range Error Residual Total UDRE Tropo Delay UDRE UISE Validity

Create Range Analysis

2 Page Controls: [Navigation] Results per Page: 10 Page #: 1/930 Save as Comma Separated Value File

GPS TIME	AZIMUTH	ELEV	IONODELAYAPPLY
1076383970	134.33	7.37	3.5960
1076383971	134.32	7.37	3.5960
1076385380	126.50	14.17	2.58
1076385381	126.50	14.17	2.58
1076385382	126.49	14.18	2.5790
1076385383	126.48	14.18	2.5790
1076385384	126.48	14.19	2.5790
1076385385	126.47	14.19	2.5780
1076385386	126.47	14.20	2.5780
1076385387	126.46	14.20	2.5770

Additional Information Tab

The Additional Information Tab includes a glossary for all Position Data and Range Data terms along with the Icon Color Thresholds. This is the same in both Internet Explorer and Chrome.

The screenshot shows a software interface with four tabs: 'Real-Time Receiver Map', 'Real-Time Receiver Status', 'Receiver Analysis Mode', and 'Additional Information'. The 'Additional Information' tab is active and contains three main sections, each highlighted with a red box:

Position Data Glossary of Terms

- Nav Mode - User Operating Mode (0 = Initialization, 1 = SPS, 2 = NPA, 3 = PA)
- Nav Status - Navigation Solution is valid (1 = yes, 0 = no)
- Sat Valid - Number of GPS & GEO satellites in user solution
- Flag - Receiver data validity flag (0 = RCVR valid, 1-10 = Number of healthy SV's not used, -1 = solution has diverged)
- HDOP - Horizontal Dilution of Precision
- VDOP - Vertical Dilution of Precision
- HPL - Horizontal Protection Level (meters)
- VPL - Vertical Protection Level (meters)
- East Error - East Position Error = Estimate - Truth (meters)
- North Error - North Position Error = Estimate - Truth (meters)
- Vert Error - Vertical Position Error = Estimate - Truth (meters)

Range Data Glossary of Terms

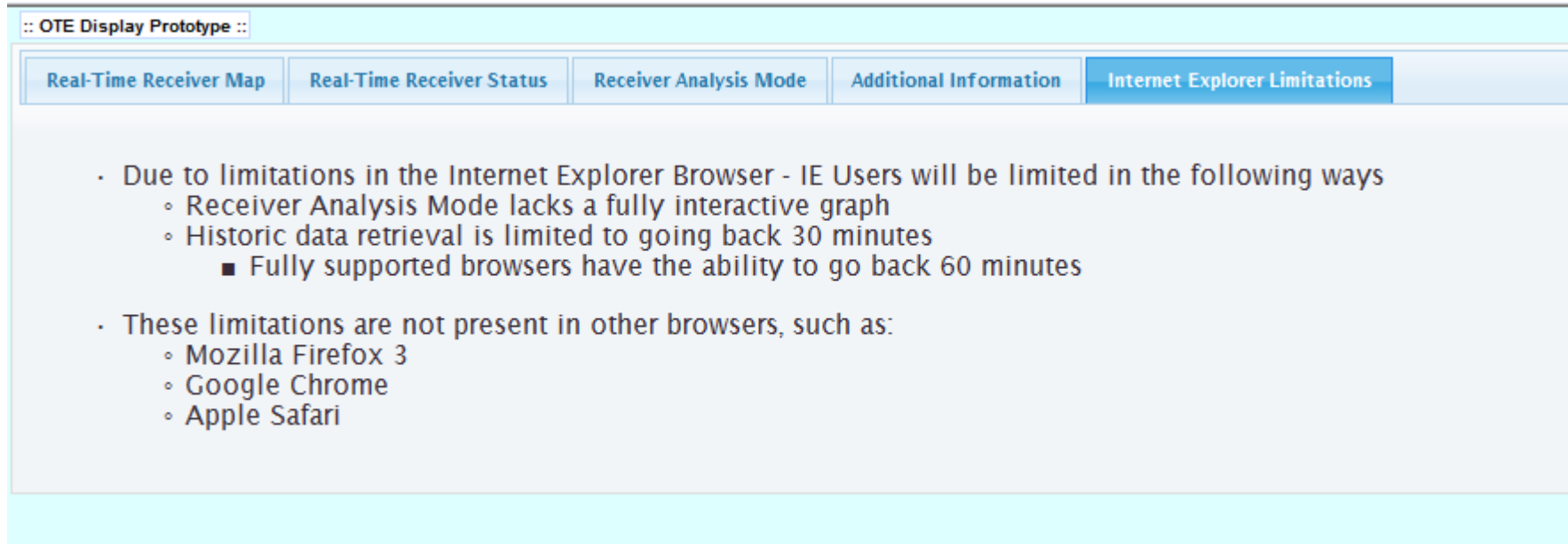
- Elevation - Satellite elevation in degrees (0 - 90)
- Azimuth - Satellite azimuth in degrees (0 - +/-180)
- Quality - Supported Operating Mode (0 = invalid, 1 = SPS, 2 = NPA, 3 = PA)
- Validity - Range Error is used in Position Solution (1 = yes, 0 = no)
- Tropo Delay - Slant Tropospheric Delay (meters)
- Error - Range Error to Satellite: Estimate - Truth (meters)
- Total UDRE - Total User Differential Range Error (meters)
- Iono Error - Ionospheric Error: Estimate - Truth (meters)
- Iono Delay - Ionospheric Delay (meters)
- Residual - Navigation Solution Range Residual
- UISE - User Ionospheric Slant Error (meters)
- UDRE - WAAS User Differential Range Error (meters)
- Long Corrections - WAAS Long Corrections (meters)
- Corrections - WAAS Fast Corrections (meters)
- Rate Corrections - WAAS Clock Corrections (meters)
- Diff Delay - Dual Frequency Iono Delay Calculated against L1
- SNR - Signal to Noise Ratio (dB)
- Status - RCVR Signal Data Flag (1 = valid, 0 = invalid)
- Flags - Signal Used in Calculation (0 = Not Used, 1 = Used)
- KLOB Iono Delay - Ionospheric Delay Calculated via Klobuchar Model
- SV Used IND - Ignore, Internal Project use only

Icon Color Thresholds

Flag	>=5 : Red
	>=3 : Orange
	>=1 : Yellow
Up Error	>=5 : Red
	>=2.5 : Orange
	>=1.5 : Yellow
Sats Valid	<=4 : Red

Internet Explorer Limitations

This tab describes the limits that pertain only to Internet Explorer, hence it is just found on that browser. (See below)



The screenshot shows a web application interface with a light blue header bar containing the text ":: OTE Display Prototype ::". Below the header is a navigation menu with five tabs: "Real-Time Receiver Map", "Real-Time Receiver Status", "Receiver Analysis Mode", "Additional Information", and "Internet Explorer Limitations". The "Internet Explorer Limitations" tab is currently selected and highlighted in a darker blue. The main content area below the tabs contains a bulleted list of limitations for Internet Explorer users.

- Due to limitations in the Internet Explorer Browser - IE Users will be limited in the following ways
 - Receiver Analysis Mode lacks a fully interactive graph
 - Historic data retrieval is limited to going back 30 minutes
 - Fully supported browsers have the ability to go back 60 minutes
- These limitations are not present in other browsers, such as:
 - Mozilla Firefox 3
 - Google Chrome
 - Apple Safari