Glenda Project – Active Payloads - Application

April 22nd , 2016 – Balloon Launched Payload – Storm Intercept

On April 22th, 2016, the Glenda Project launched its latest iteration weather balloon system deploying a Vaisala RS-92 SGP radiosonde payload, combined with our updated antenna and receiver ground station.

The April 22nd flight featured a 400 gram balloon filled with 50 cubic feet of helium. Projected flight altitude was approximately 90,000 feet. The RS-92 payload contained a GPS positioning system plus a weather sensor suite telemetry package. Ground wind speed was around 10 mph with temperatures in the 70's.

The radiosonde ground station featured our existing Sirio WY400-10N Yagi antenna combined with our new Uniden BC-125AT Narrow Band FM (NFM) receiver.

Shortly after 3:15pm, a thunderstorm passed through the area and the weather balloon and its associated payload were ingested into the storm system for a successful storm intercept.

Flight performance was impressive and we achieved a viable data set from launch to balloon burst at just over 50,000 feet, continuing on under parachute until loss of signal at 41,000 feet due to the level of turbulence from the storm cell combined with earth curvature and local terrain.

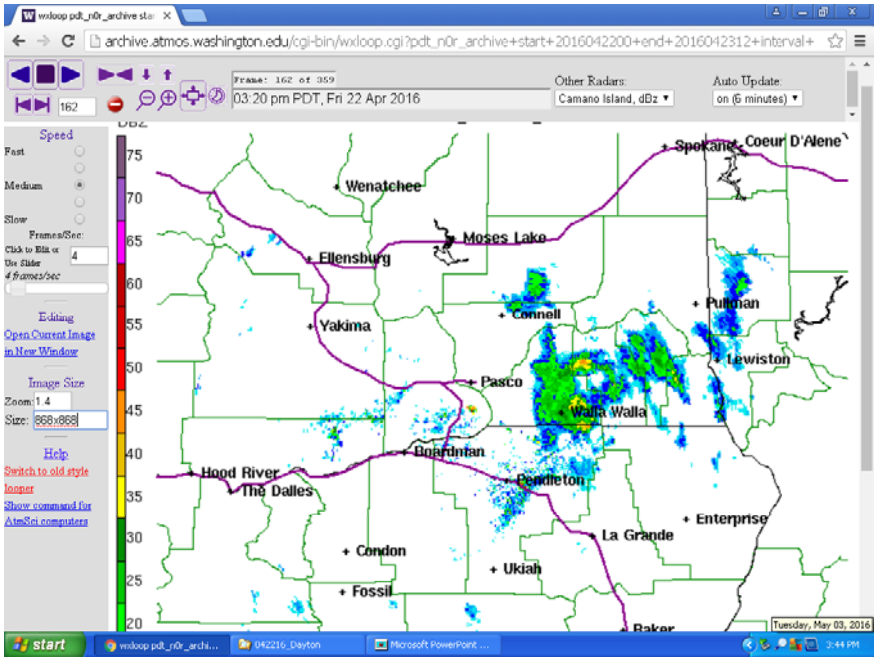
The following slides display the data collected from the flight.

Glenda Project – Active Payloads - Application

April 22nd , 2016 – Balloon Launched Payload – Storm Intercept

Photo Courtesy of Liz Quigg

Visual of Storm Intercept

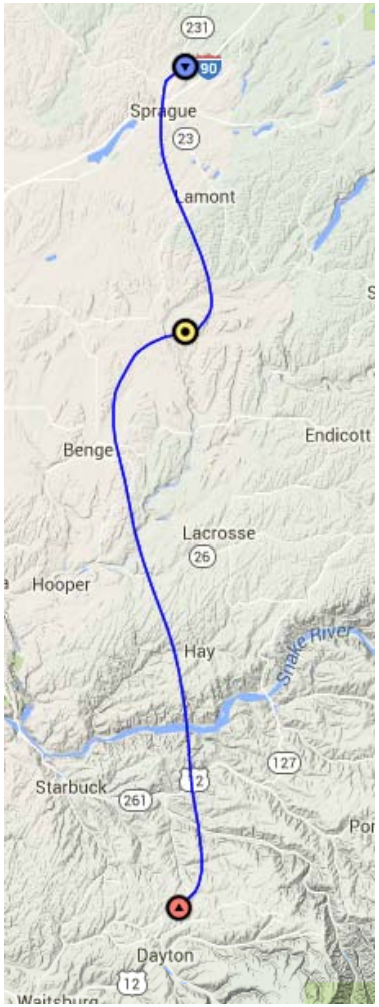


Pendleton, OR – Radar Track

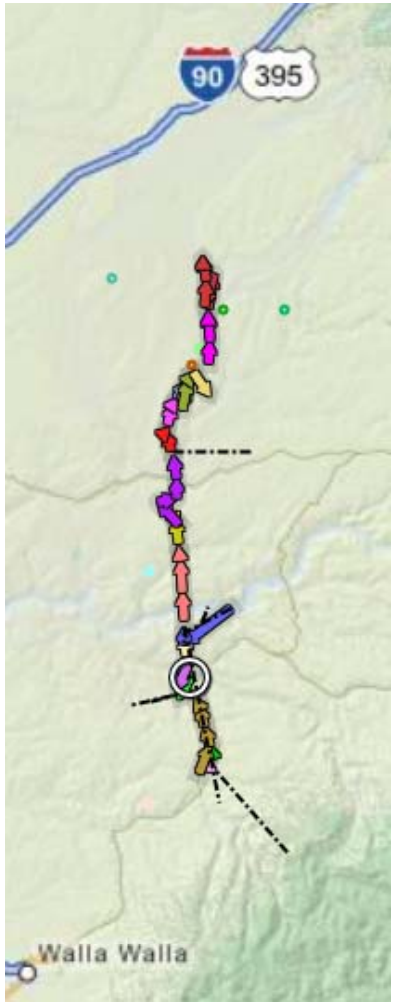
The storm cell that was intercepted, was tracked on Pendleton, OR radar and visually by the intercept team. Our mobile ground station collected a viable data set and that data is shown in the following slides as well.

Glenda Project – Active Payloads - Application

April 22nd, 2016 – Balloon Launched Payload – Ground Track



Flight Simulation



Actual Flight Path

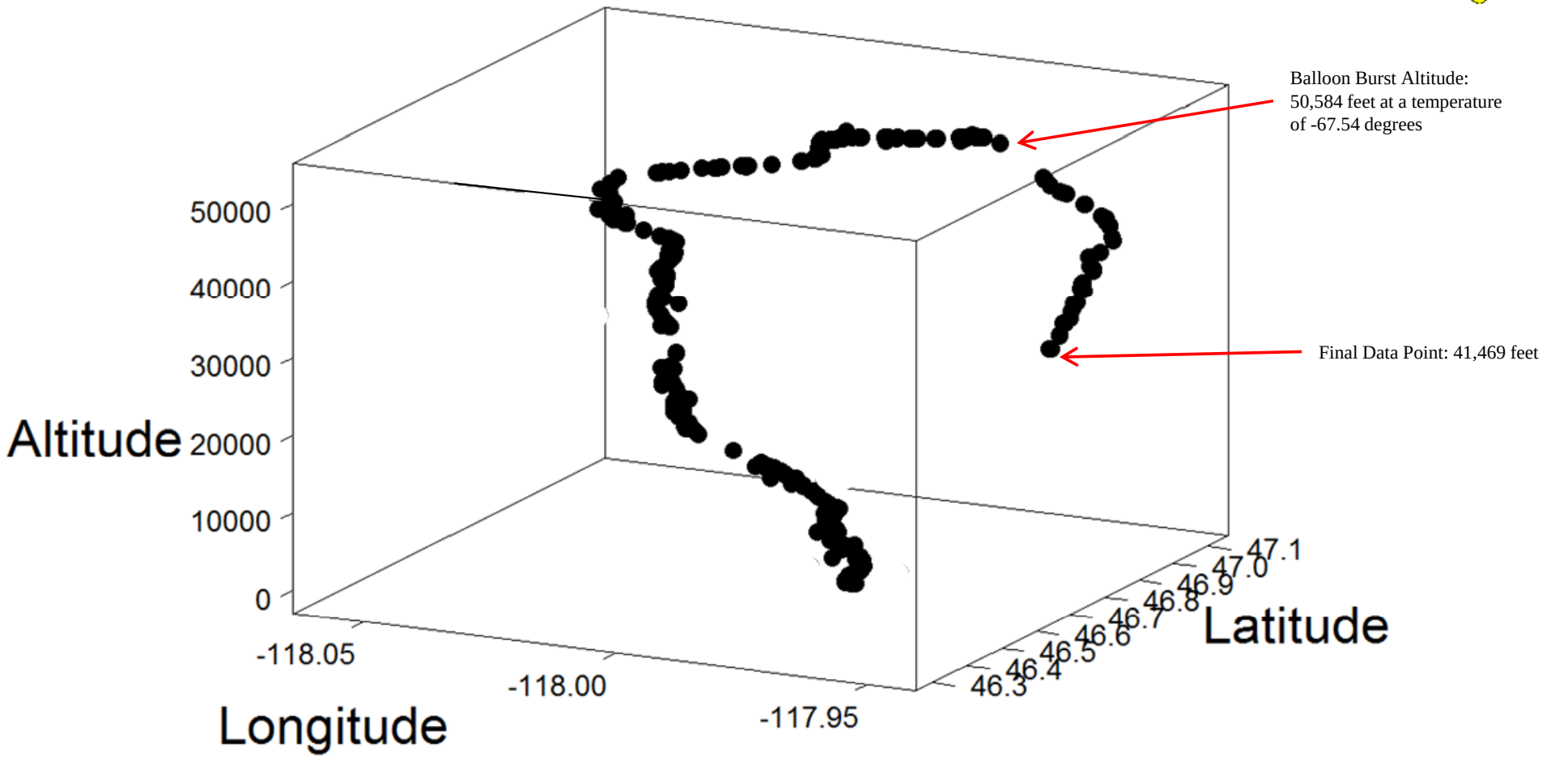
The actual flight trajectory ground track measured just over 60 miles before loss of signal and aligned very well with the pre-flight simulation.

After transition from launch conditions, the balloon was ingested into the passing storm system and followed its south to north storm track.

Ground wind speed exceeded 30 mph, while the storm ground track was close to 40 mph.

Glenda Project – Active Payloads - Application

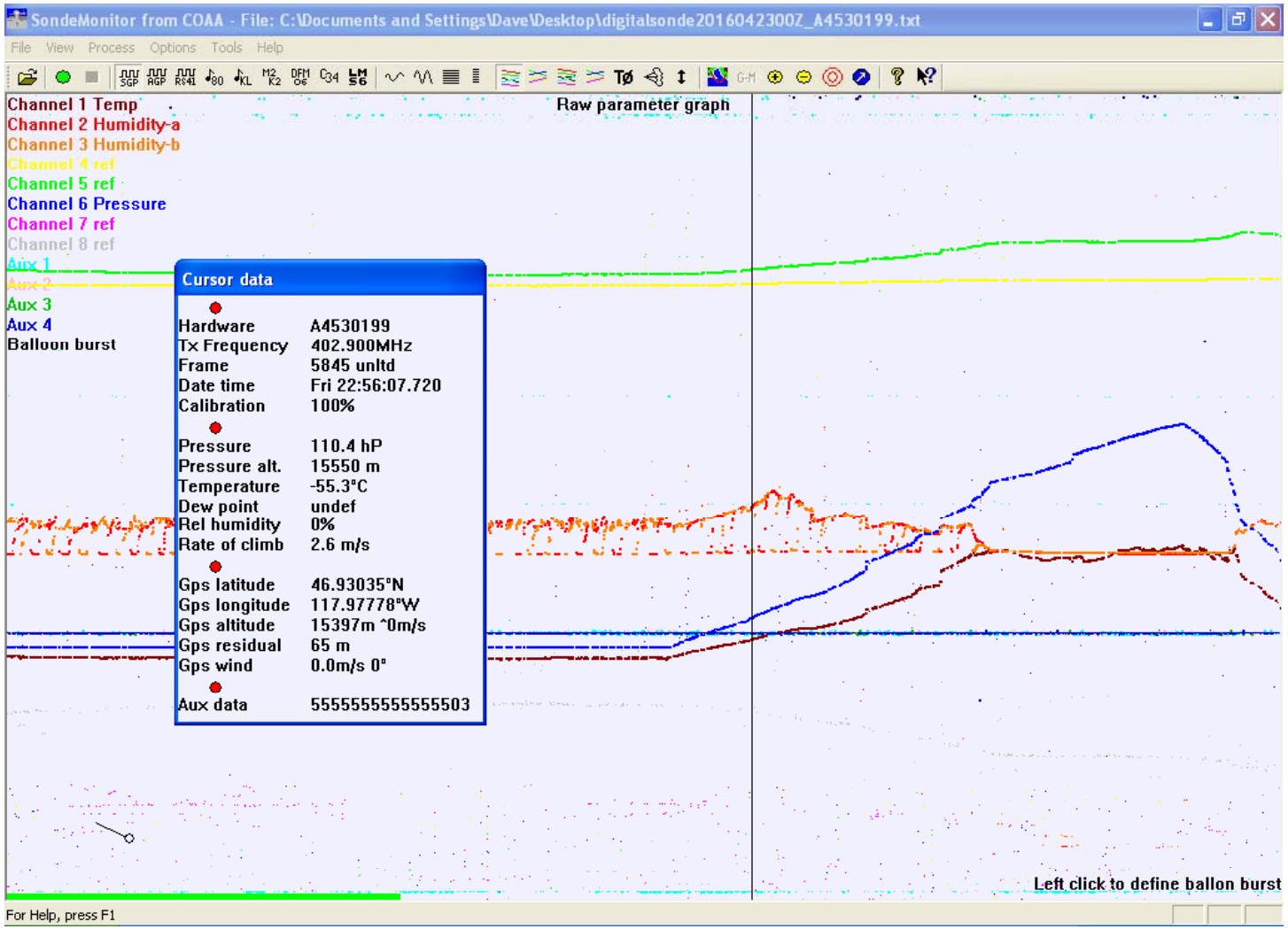
April 22nd, 2016 – Balloon Launched Payload – Altitude Track



While the balloon ground track appears linear, the balloon and its payload followed the circulation of the storm cell and hovered along the top of the cell while also moving in a south to north path.

Glenda Project – Active Payloads - Application

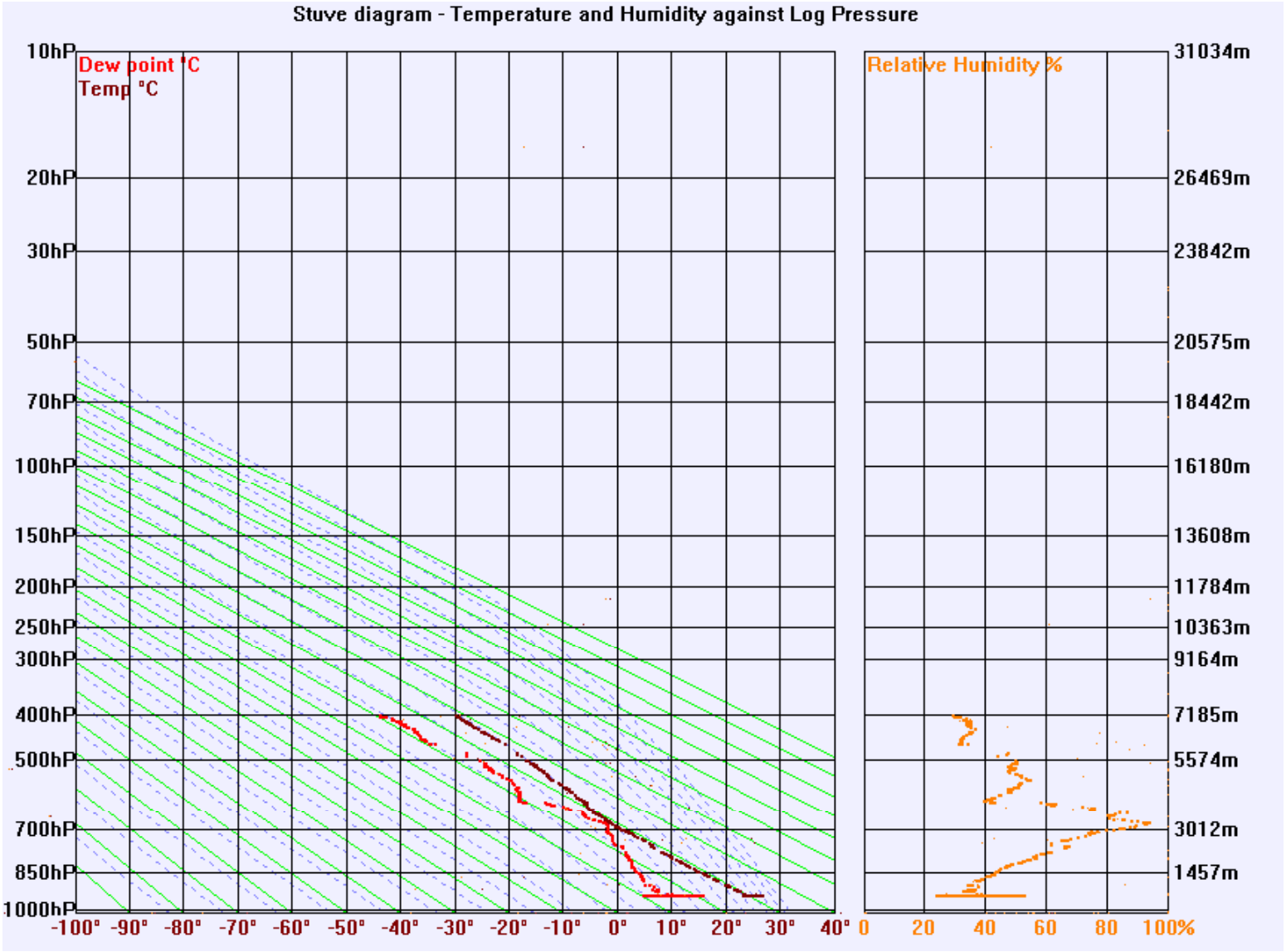
April 22nd, 2016 – Balloon Launched Payload – Software



The Sondemonitor software performed flawlessly providing data capture collected via the upgraded antenna and receiver.

Glenda Project – Active Payloads - Application

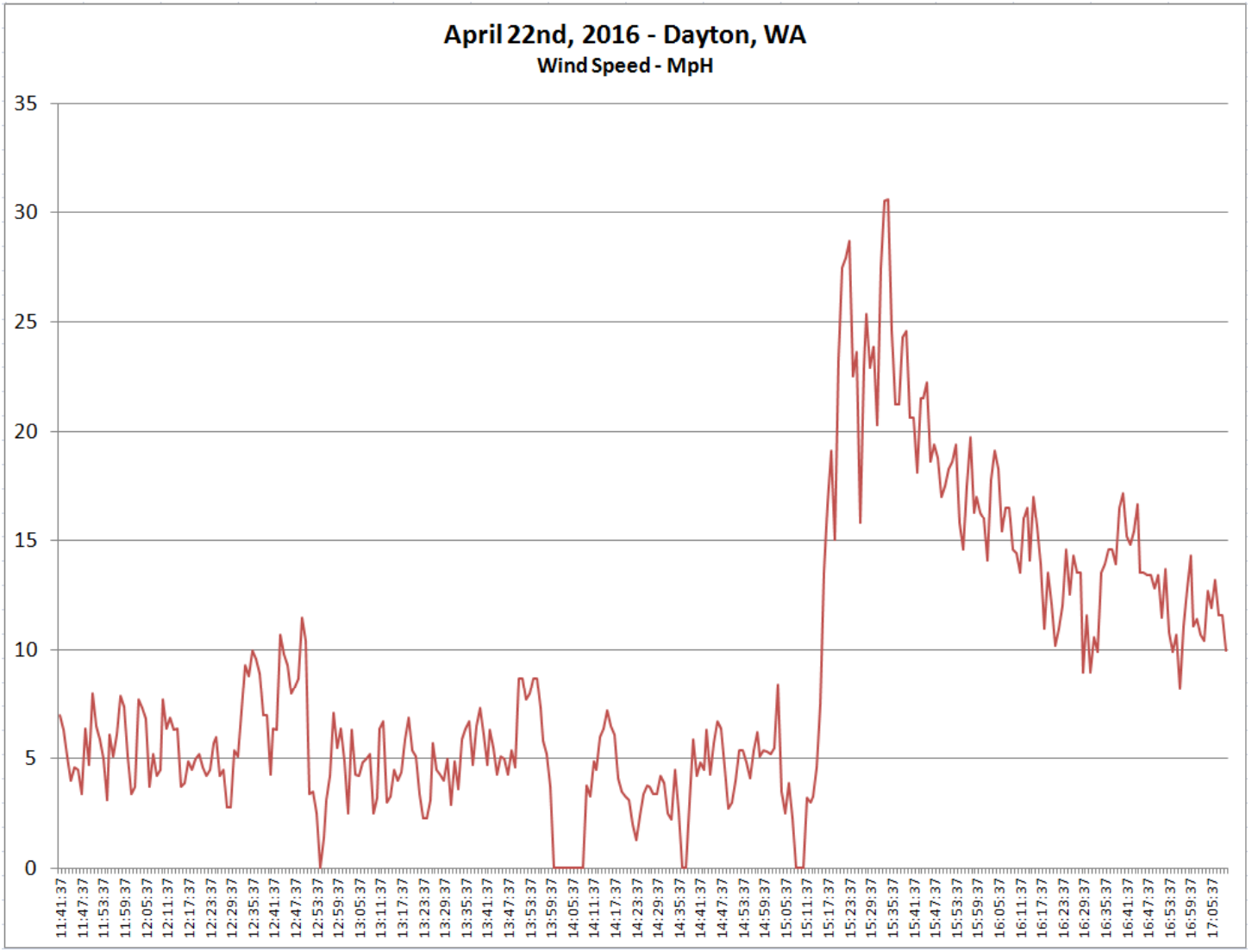
April 22nd, 2016 – Balloon Launched Payload – Weather Sensor Data



The Sondemonitor software also provides Temperature, Dew Point, and Relative graphing capability vs pressure / altitude.

Glenda Project – Active Payloads - Application

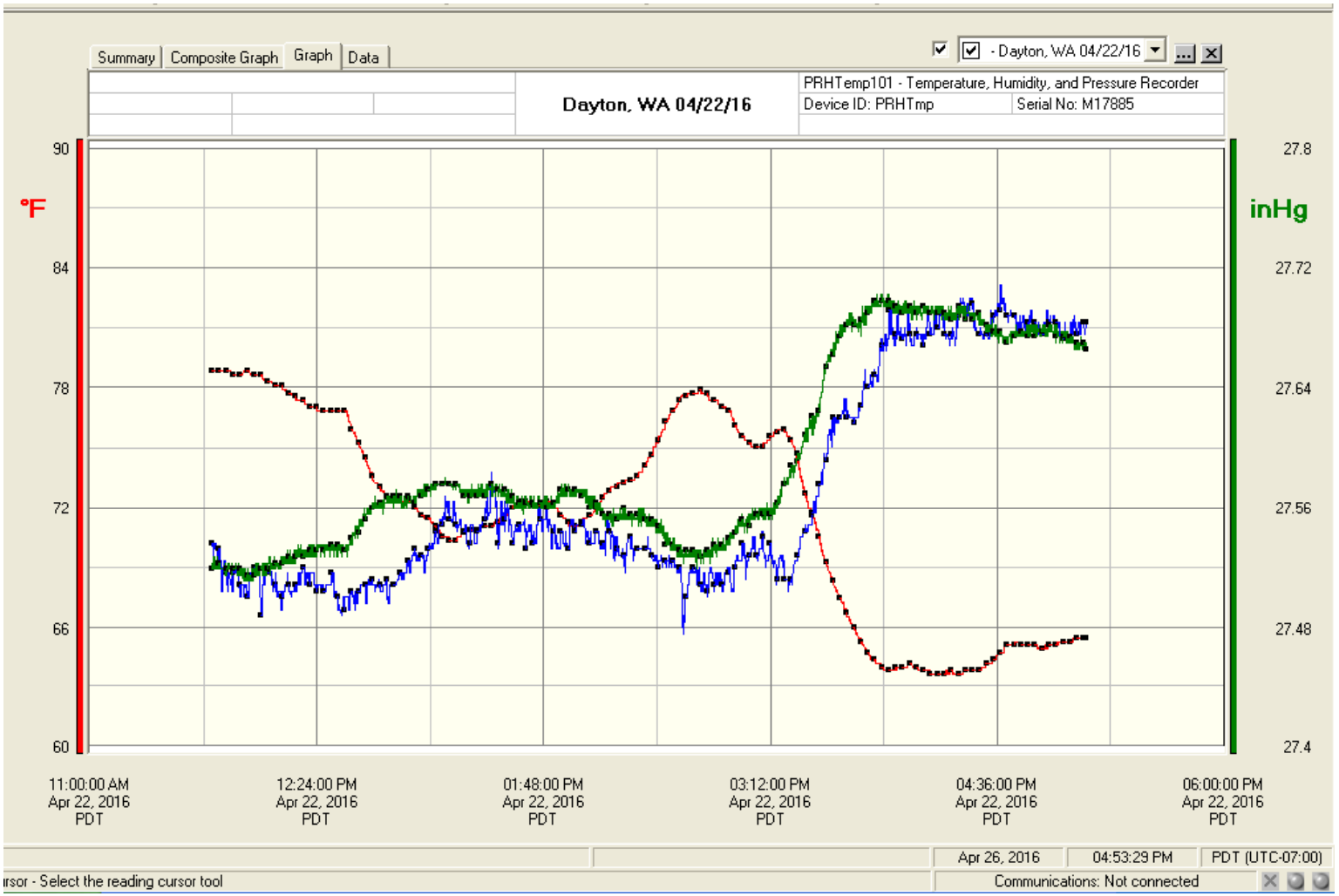
April 22nd, 2016 – Ground Station Data – Wind Speed



In parallel with the balloon launch, Glenda was also capturing ground condition data. The storm cell impacted our collection site just after 3:15 pm as the balloon payload was being ingested into the storm cell. Winds in excess of 30 mph were recorded. While not as impressive as our June 2012 storm intercept, it is still a significant accomplishment as we've now added the balloon intercept capability.

Glenda Project – Active Payloads - Application

April 22nd, 2016 – Ground Station Data – Temp, Baro, RH



Temperature, Barometric Pressure, and Relative Humidity data were also being collected in real time at less than 2 second intervals during the storm intercept as well. A noticeable shift can be seen in the data as the storm cell passes over the collection site.

Glenda Project – Active Payloads - Application

April 22nd, 2016 – Balloon Launched Payload – Lessons Learned / Next Steps

The results of this flight establishes the capability of the Glenda Project to launch balloon deployed payloads into thunderstorms, and tornadic systems.

The flight was an operational success, as it verified that the Uniden BC125AT combined with the Sirio Yagi is an efficient and effective combination. A side effect of this receiver / antenna combination, is that we no longer need the additional omni-directional antenna.

While the intent of the flight was to extend the flight envelope from our existing 35,000 foot altitude range, we were able to achieve our first successful storm intercept with a balloon launched payload. While we did not achieve our maximum targeted altitude of 80,000 feet, between the balloon icing up, storm turbulence, and the age of the balloon, 50,000 feet is still a significant accomplishment.

The existing mature ground station data collection performed very well and captured a solid data set.

An interesting side effect was that we found that our existing alkaline batteries perform very will at extremely low temperatures (-67 degrees F) and should serve us well in the future, in that, we'll no longer be needing Lithium cells.

The success of this launch culminates over 15 years of development and operational maturity. Additional launches are planned further extending the flight envelope as our systems continue to grow and evolve.