



Elevation/Altitude Comparisons Using the S4 “Satellite” Data Sensors

Wendy Holforty, PhD

Girl Scouts of Northern California

Girls Go Tech Initiative

Elevation vs Altitude

- Elevation
 - the height of a geographic location above a fixed reference point
 - the reference point is usually mean sea level (MSL)
 - elevation (geometric height) is mainly used when referring to points on the Earth's surface
- Altitude
 - while altitude (geopotential height) is used for points above the surface, such as an aircraft in flight or a spacecraft in orbit

Elevation vs Altitude

- Given that the data were taken with my “satellite”
- And, the equations I used to determine my “satellite’s” height above mean sea level are for determining various forms of altitude
- I will refer to my results in terms of altitude

Different Altitudes

- True Altitude
 - altitude in terms of elevation above sea level
- Pressure Altitude
 - the air pressure in terms of altitude in the International Standard Atmosphere
- Density Altitude
 - the density of the air in terms of altitude in the International Standard Atmosphere

Question

- I wanted to:
 - compare the differences of these altitudes
 - try different correction methods to determine whether it's possible to correct these altitudes to “true”

Data Collected

- GPS Altitude (m)
- Barometric Pressure (Pa)
- Temperature ($^{\circ}\text{C}$)
- Humidity

Challenges

- Data Collection
 - I ended up with 512 files with several
 - Spent too much time appending data into one file
- GPS Position Error

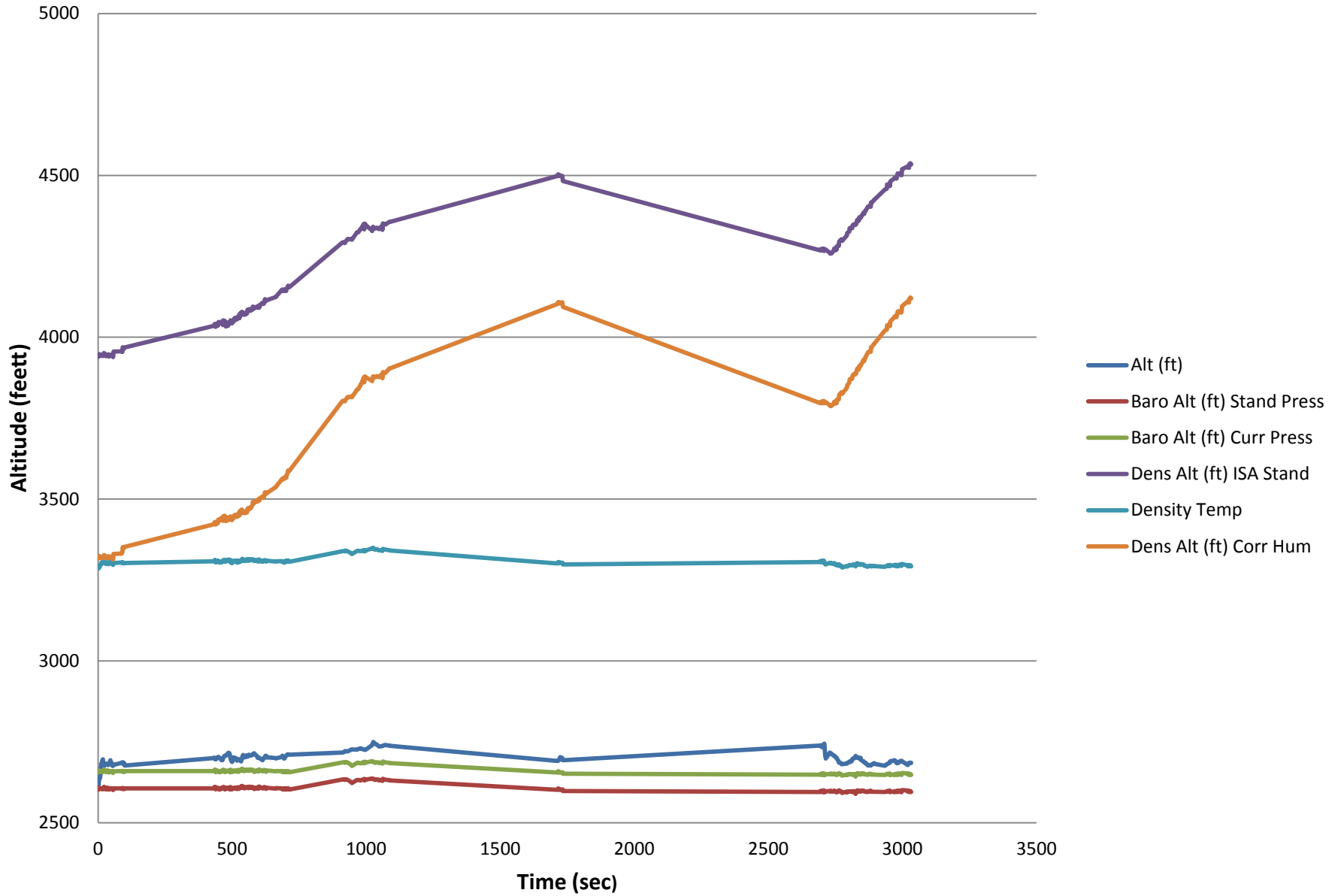
Data Set – 200 of 512 files



GPS Position Error



Comparison of Altitude



Conclusions

- Better understanding of the relationship between the various methods of calculating altitude (various definitions)
- A better understanding of the errors from the various sensors and include in the analysis
- A better understanding of the correction methods in order to adequately compare the results