Preliminary comparison between ASO and TLS lidar data from NASA SnowEx data

Photo: Chris Hiemstra
TLS Site A
ASO vs. TLS Point Clouds

**TLS:** NAVD88 vertical datum (geoid)

**ASO:** Height above WGS84 ellipsoid

Transform ASO to match TLS Datum

~16 m difference
**Vertical Uncertainty Due to Transformation: 7.62 cm**
Point Cloud to Raster

1. Used licensed version of lasground (lasTools) to **classify** the point cloud data
   - Parameters: step size of 2 - no offset - no thinning
   - Evaluated the sensitivity of these parameters using snow-off photos

2. **Gridded** the ground points using lasGrid (lasTools)
   - Took the average ground points within a 1-m grid
Key Points:
1. TLS was consistently higher in elevation than ASO despite same vertical datum (NAVD88)
   • Mean Difference: 81 cm, Median Difference: 76 cm
2. ASO - TLS "Snow-Off Differences" are very heterogenous (~30 cm differences)
3. Areas between snow-off TLS Scans (red box) had elevation differences that flipped with respect to the median value
Snow-Off Surface at Site K

View from photo above

Same patch of trees

View from photo above
Key Points:
1. Again, TLS was consistently higher in elevation than ASO despite same vertical datum
   • Mean Difference: 74 cm, Median Difference: 69 cm
2. ASO - TLS "Snow-On Differences" are much smoother than "Snow-Off Differences"
Key Points:
1. Snow depth differences within this domain were around 4.8 cm (mean) or 5 cm (median)
2. ASO snow depth higher in some areas (blue) while TLS higher in others (red)
3. Difficult to determine the source of these differences but the heterogeneity is likely from difficulty with obtaining the true snow-off surface.