ISFS Boom Angles and Tilts

Scan	1			2**		
Boom	7m	17m	27m	7m	17m	27m
x	3085324.03145666	3085323.65345666	3085323.27145666	940408.628956629	940408.510956626	940408.390456623
y	1770315.92132804	1770316.34532804	1770316.87582805	539593.375328018	539593.509828022	539593.672828027
z* (m)	5.56701614659823	15.8755162416765	26.0945163359288	5.54405297354083	15.8570532856115	26.0755535948222
lat	39°56'52.575"	39°56'52.579"	39°56'52.584"	39°56'52.575"	39°56'52.579"	39°56'52.585"
lon	-105°11'44.494"	-105°11'44.499"	-105°11'44.504"	-105°11'44.495"	-105°11'44.5"	-105°11'44.505"
az (deg)	358.325803427737	358.671842595833	0.342652209509851	358.406401013538	358.387795349662	0.142644044710664
pitch (deg)	0.109767611226856	-0.192215340858511	0.559043450656589	0.398341787010092	-0.521512160530745	1.80623368783019
roll (deg)	0.995349254442227	-1.8113964174835	5.3250072590622	-2.94438519054225	-1.6249548877957	0.55234667489206

*Heights are probably short by 0.5 m because of the unknown height of the trailer bed above the ground

**Scan 2 values are in meters, instead of the US survey feet used in scan 1. Converting these values into US survey feet is necessary for lat,lon transformation. Fun fact: if you transform the values in meters, you end up in the Grand Canyon.

The coordinate system used in these scans is: CO C NAD83 G18 EPSG: 6428

The website used to transform coordinate systems is: https://epsg.io/transform#s_srs=6428&t_srs=4326&x=3085323.1943564&y=1770316.9082700

Some observations:

- The average difference in height between the scans is ~2 cm, which is near the accuracy limit of the Leica
- The average difference in boom angle between the scans is ~0.2 degrees
- The differences in pitch and roll between the scans varies between 0.29-1.25 degrees and 0.19-4.77 degrees, while changing signs in one instance
- We were skeptical of our measurement (especially in roll) of the 27m sonic from the first scan because we may have been measuring one of the transducer spars instead of the transducer ball
- It's possible this error may have been reproduced for the 7m sonic in scan 2, as it's difficult to properly site the transducer ball from all angles and at all heights