

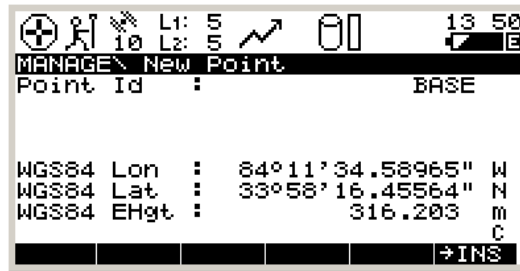
Advantage FAQ

Question

While setting up an RTK reference station, I mistakenly entered an orthometric height as an ellipsoid height. Now in SKI-Pro the heights of the points my rover collected are listed as ellipsoidal heights but I know they are orthometric heights. How can I fix this?

Background

The image below displays the coordinates that were entered as the reference station in the SR530. The latitude and longitude are correct but the ellipsoid height is incorrect.



In this problem, the user has entered an orthometric height (316.203m) as the reference height coordinate in the ellipsoid height field. The user knows the geoid separation for this point (-29.5546m) from their data sheet. (Note: SKI-Pro can also compute the geoid separation.)

Orthometric heights, ellipsoid heights, and geoid separations (also referred as geoid heights) together can be expressed using the formula:

$$h = H + N$$

where **h** = ellipsoid height

H = orthometric height

N = geoid separation

Using this formula and only having the orthometric height (316.203m) and the geoid separation (-29.5546m), the user can calculate the ellipsoid height that should have been entered in the ellipsoid height field.

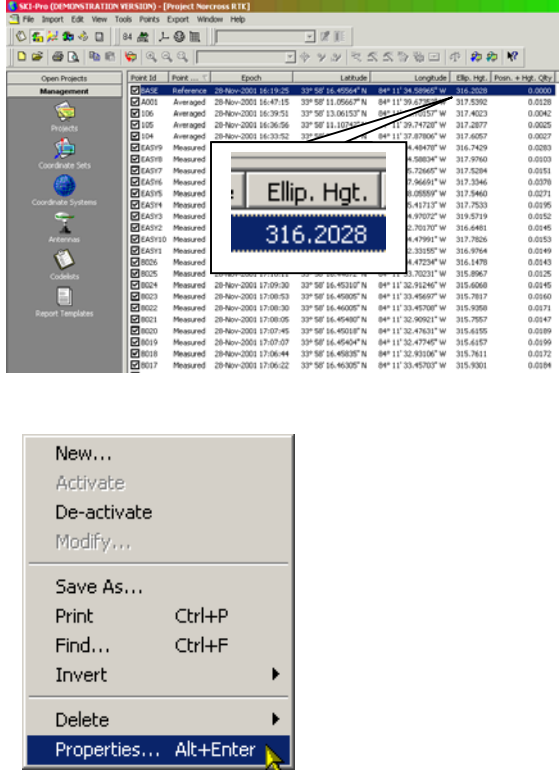
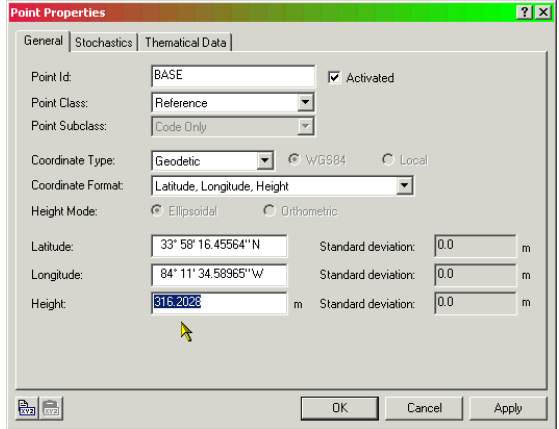
$$\text{Ellipsoid height} = 316.203 + (-29.5546)$$

$$\text{Ellipsoid height} = 286.648\text{m.}$$

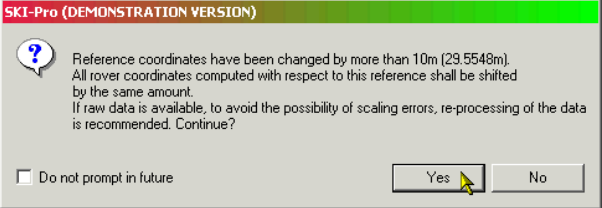
Answer

In SKI-Pro version 2.5 or higher, the coordinates of the reference station can easily be changed and all the associated rover point coordinates will be shifted accordingly.

Continued on next page

Step	Action	Display
1	<p>The image on the left is from SKI-Pro's Points view. You can see that the ellipsoid height displayed for the reference point is actually the orthometric height (316.2028).</p> <p>In SKI-Pro version 2.5 or higher in the "Points" view:</p> <ul style="list-style-type: none"> Right-click on the reference station point. <p>This opens a context window. In the context menu:</p> <ul style="list-style-type: none"> Select "Properties...". <p>This takes you to the "Point Properties" screen.</p>	
2	<p>In the "Point Properties" screen:</p> <ul style="list-style-type: none"> Highlight the value in the "Height" field. Enter the correct ellipsoid height. Press the Apply button. <p>This opens an alert box warning.</p>	

Continued on next page

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3	<p>This alert box warns you about the shift in the vertical component in this case, that will occur at the reference and all rover points related to that reference.</p> <ul style="list-style-type: none"> Press the Yes button to accept the shift. <p>This closes the alert box.</p> <p>Continuing in the “Point Properties” screen:</p> <ul style="list-style-type: none"> Press the OK button. <p>This closes the “Point Properties” screen.</p> <p>In the “Points” view you can see that all of the ellipsoid heights have been shifted by the amount of the geoid separation (-29.5546).</p> <p>Now you can compute and apply geoid separations to these ellipsoid heights to obtain the correct orthometric heights.</p>	 <table border="1"> <thead> <tr> <th>Latitude</th> <th>Longitude</th> <th>Ellip. Hgt.</th> <th>Posn. + Hgt. Qty</th> </tr> </thead> <tbody> <tr><td>33° 58' 16.45564" N</td><td>84° 11' 34.58965" W</td><td>286.6480</td><td>0.0000</td></tr> <tr><td>33° 58' 11.05664" N</td><td>84° 11' 39.67354" W</td><td>287.9844</td><td>0.0128</td></tr> <tr><td>33° 58' 13.06151" N</td><td>84° 11' 40.70160" W</td><td>287.8475</td><td>0.0042</td></tr> <tr><td>33° 58' 11.10740" N</td><td>84° 11' 39.74730" W</td><td>287.7329</td><td>0.0025</td></tr> <tr><td>33° 58' 09.40949" N</td><td>84° 11' 37.87808" W</td><td>288.0509</td><td>0.0027</td></tr> <tr><td>33° 58' 11.03733" N</td><td>84° 11' 34.48478" W</td><td>287.1881</td><td>0.0283</td></tr> <tr><td>33° 58' 12.70631" N</td><td>84° 11' 34.58834" W</td><td>288.4212</td><td>0.0103</td></tr> <tr><td>33° 58' 12.56681" N</td><td>84° 11' 35.72665" W</td><td>287.9736</td><td>0.0151</td></tr> <tr><td>33° 58' 12.41861" N</td><td>84° 11' 37.96692" W</td><td>287.7798</td><td>0.0378</td></tr> <tr><td>33° 58' 12.55207" N</td><td>84° 11' 38.05560" W</td><td>287.9912</td><td>0.0271</td></tr> <tr><td>33° 58' 14.49165" N</td><td>84° 11' 35.41713" W</td><td>288.1985</td><td>0.0195</td></tr> <tr><td>33° 58' 14.56251" N</td><td>84° 11' 34.97073" W</td><td>290.0171</td><td>0.0152</td></tr> <tr><td>33° 58' 14.27209" N</td><td>84° 11' 32.70169" W</td><td>287.0933</td><td>0.0145</td></tr> <tr><td>33° 58' 10.25459" N</td><td>84° 11' 34.47991" W</td><td>288.2278</td><td>0.0153</td></tr> <tr><td>33° 58' 15.05588" N</td><td>84° 11' 32.33154" W</td><td>287.4216</td><td>0.0149</td></tr> <tr><td>33° 58' 16.45422" N</td><td>84° 11' 34.47234" W</td><td>286.5930</td><td>0.0143</td></tr> <tr><td>33° 58' 16.44672" N</td><td>84° 11' 33.70231" W</td><td>286.3419</td><td>0.0125</td></tr> <tr><td>33° 58' 16.45310" N</td><td>84° 11' 32.91245" W</td><td>286.0520</td><td>0.0145</td></tr> </tbody> </table>	Latitude	Longitude	Ellip. Hgt.	Posn. + Hgt. Qty	33° 58' 16.45564" N	84° 11' 34.58965" W	286.6480	0.0000	33° 58' 11.05664" N	84° 11' 39.67354" W	287.9844	0.0128	33° 58' 13.06151" N	84° 11' 40.70160" W	287.8475	0.0042	33° 58' 11.10740" N	84° 11' 39.74730" W	287.7329	0.0025	33° 58' 09.40949" N	84° 11' 37.87808" W	288.0509	0.0027	33° 58' 11.03733" N	84° 11' 34.48478" W	287.1881	0.0283	33° 58' 12.70631" N	84° 11' 34.58834" W	288.4212	0.0103	33° 58' 12.56681" N	84° 11' 35.72665" W	287.9736	0.0151	33° 58' 12.41861" N	84° 11' 37.96692" W	287.7798	0.0378	33° 58' 12.55207" N	84° 11' 38.05560" W	287.9912	0.0271	33° 58' 14.49165" N	84° 11' 35.41713" W	288.1985	0.0195	33° 58' 14.56251" N	84° 11' 34.97073" W	290.0171	0.0152	33° 58' 14.27209" N	84° 11' 32.70169" W	287.0933	0.0145	33° 58' 10.25459" N	84° 11' 34.47991" W	288.2278	0.0153	33° 58' 15.05588" N	84° 11' 32.33154" W	287.4216	0.0149	33° 58' 16.45422" N	84° 11' 34.47234" W	286.5930	0.0143	33° 58' 16.44672" N	84° 11' 33.70231" W	286.3419	0.0125	33° 58' 16.45310" N	84° 11' 32.91245" W	286.0520	0.0145
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Further reading For more information on ellipsoids, geoids, and coordinate systems, please see the following:

GPS Newsletters Vol. 00, No. 20-23 and Vol. 01, No. 19-21. These can be found at http://www.leicaatl.com/support/gps/GPS_Archives_Newsletters.htm

Advantage FAQs at http://www.leicaatl.com/support/gps/GPS_FAQ_Home.htm