DGPS Report

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Introduction

In this field work the goal was to obtain coordinates from points where it later is going to be performed drilling. There was also measurements along a profile of a road. The coordinates was obtained with DGPS from Leica with post processing in Leica GeoOffice computer program. Base station was placed close to Sysselmannens office in Longyearbyen and the survey area was in Adventdalen some kilometers away. The methods used were "static" and "stop and go".

Theory

Methods used were "static" and "stop and go". The method "static" is used to get coordinates with accuracy of 10mm + 1mm/km . The accuracy depends upon the measuring time, how many measurements and the geometric position of the satellites and the distance to the base station. The method "stop and go" is used to obtain coordinates when the distance between the points is small. The first point needs an initializing period of some minutes while the rest of the points only need one storage of data. The accuracy of "stop and go" mode is 1-2 cm.

Before data collection in the field could begin some settings had to be done. The cut of angel was set to 15°. The cut of angle is the angel above the horizon not to collect data from satellites. If the satellites is under the cut of angle the signal for the satellite would be disturbed by the ionosphere and troposphere.

Logging time interval was set to 2 seconds. This is the time between two data loggings. Shorter logging intervals gives better data, but also more data to process. The total logging time at each point was approximately 12 minutes. The total logging time is dependent of the number of satellites and the geometry. At far distances from the base station the total logging has to be longer to obtain good coordinates.

The quality of the coordinates depends of the total logging time. If the point's coordinates gets a code solution the distance to the satellite is calculated with the code in the signal. If the quality is of float solution, the reason could be to short observation time.

Results after processing

Short-time-static points and stop-and-go profile

The table below shows the processed data with UTM coordinates. The local heights were used to be able to transform the ellipsoidal height to heights above the mean sea level.

Point	Easting	Northing	Ellip. height (m)	Geoid. height (m)	Height above sea level (m)	Point class
Base station						
n124	514281.5745	8683207.4200	61.5014	-	-	CTRL
Short-time-static points						
p1	518888.8314	8681032.5447	32.2496	31.72970644	0.519893561	MEAS
p2	518882.1249	8681050.9753	32.1347	31.7297316	0.4049684	MEAS
p3	518900.9801	8681049.2785	32.3343	31.72974684	0.604553164	MEAS
p4	518926.7458	8681056.3359	32.4807	31.72978374	0.75091626	MEAS
Stop-and-go profile						
100	518794.5550	8681016.2362	32.5209	31.72958773	0.79131227	MEAS
101	518796.0016	8681018.1853	32.8682	31.72959247	1.138607535	MEAS
102	518802.3666	8681025.3191	33.0436	31.72961083	1.313989171	MEAS
103	518804.7083	8681027.4810	32.9122	31.72961679	1.182583209	MEAS
104	518809.3156	8681030.7724	32.6064	31.72962687	0.876773129	MEAS
105	518817.6747	8681036.9709	32.5268	31.72964555	0.797154451	MEAS

We did not get the right value for the control point N124. The control point should be (and was used for the calculations):

Point	Easting	Northing	Ellip. Height (m)	Geoid. Height (m)	Point class
n124	514280,722	8683206,071	61.5014	31,729	CTRL

Plot of stop-and-go profile

Below is the plot of the stop-and-go profile (100-105) where the distance between the points can be seen and the height above the sea level.

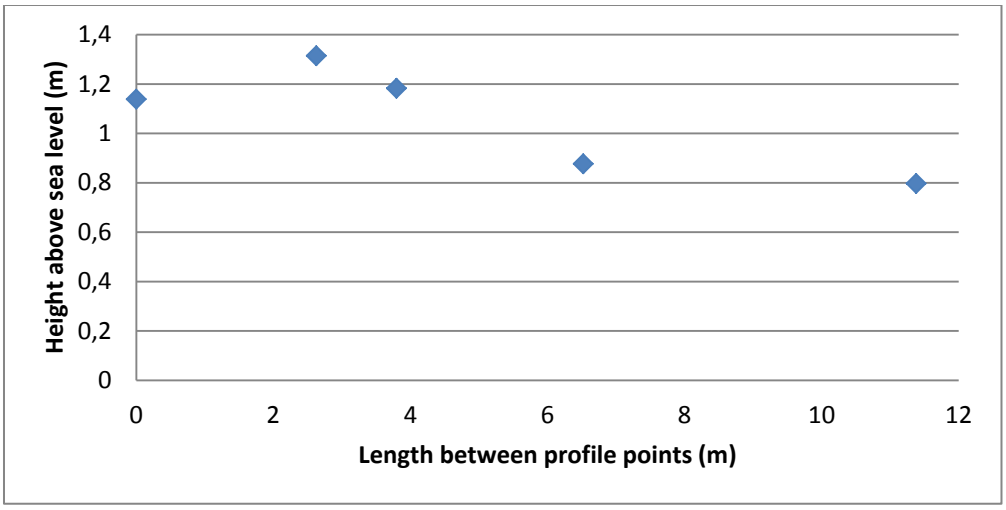

Figure 1. Plot of stop-and-go profile with the height above sea level and distance between measuring points.

Transformation of UTM coordinates to ED50

The formula in the exercise description was used to calculate the old (ED50) coordinate values.

Point	Easting	ED50 (E)	Northing	ED50 (N)
100	518794.5550	518878.051	8681016.2362	8680813.825
101	518796.0016	518879.4977	8681018.1853	8680815.774
102	518802.3666	518885.8628	8681025.3191	8680822.908
103	518804.7083	518888.2045	8681027.4810	8680825.07
104	518809.3156	518892.8119	8681030.7724	8680828.361
105	518817.6747	518901.1712	8681036.9709	8680834.56
p1	518888.8314	518972.3284	8681032.5447	8680830.134
p2	518882.1249	518965.6221	8681050.9753	8680848.565
p3	518900.9801	518984.4774	8681049.2785	8680846.869
p4	518926.7458	519010.2434	8681056.3359	8680853.926

Discussion

The base station was too far away from our measuring points in Adventdalen, therefore we had trouble getting good measuring points. We got a lot of code resolutions. We also measured too short time in the stop-and-go profile to get good points. Therefore important factors are location of base station and measuring time.