# *dGPS data collection with Trimble Pro XRS device and conversion to RINEX*

NW Argentina Trimble Rover Units

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# 1 dGPS Data collection with the Trimble Pro XRS Pathfinder (L1) backpack

## 1.1 Introduction

The Trimble Pro XRS units (Fig. 1) and the TSC-1 receivers (Fig. 2) are robust and sturdy and rely on the GPS L1 and P signal (no L2 signal) and provide centi- to decimeter accuracy. We either mount these units on the top of the car with a magnet, or carry them in a backpack for off-road measurements. The basic steps are outlined in this document:

1. Setup the unit and collect data, making sure to set the antenna height
2. Download the dGPS data from the units and covert them to SSF using Trimble Data Transfer Utility (free program: http://www.trimble.com/datatransfer/) and then RINEX files using Trimble Pathfinder Office (email ben.purinton@gmail.com if this program is not available to you)
3. Correct the data in RTKLIB (free program: http://www.rtklib.com/)
    - **See second manual *dGPS Correction with RTKLIB***


**Figure 1:** Trimble Pro XRS unit, the brains of the operation.


**Figure 2:** TSC-1 reciever, the interface with the Pro XRS.

## 1.2 Setup: Problems and Solutions

When carried in the backpack, these units use lead-acid sealed 12V batteries (Fig. 3). When mounted in the car we exchange the power adapter from the clamps used on these batteries to the car outlet adapter. Please note that the dGPS units occasionally do not work properly (low battery or cannot connect to dGPS warnings). In this case, the problem (and solution) is:

1. The lead-acid battery is low in charge (check the battery with a multi-meter and charge it if needed)
2. The clamps connecting the battery to the units are not tight (tape the clamps to the prongs on the battery)
3. One or more of the cables connecting everything are broken or not tight (try switching the cables around and making sure they are connected tightly)
4. The batteries in the back of the hand-held units (Fig. 4) are loose or old (try switching the batteries around or exchanging them)

**Note:** One or more of these steps usually work to get the unit working, but it may take some time to find the problem, so don't get frustrated.


**Figure 3:** Lead-acid batteries used with the Trimble Pro XRS receivers in the backpack, using the clamps. For car mounting, remove the clamps and plug units directly into car.


**Figure 4:** Batteries in the back of the Pro XRS handheld units. These may need to be checked if the units are not working.

## 1.3 Collecting Data

Once we have the unit setup in the car or in the backpack, we are ready to log data. Follow the instructions in Figure 5-8.


**Figure 5:** Turn on the TSC-1 and wait for the GPS to connect. You will need at least 5 satellites to begin collection data. NOTE that you have to set the antenna height in Configuration->GPS rover options->Antenna. Measure the height from the ground to the bottom of the antenna. In GPS rover options, you can also set the logging interval for the point data. Usually we use a 1-2 second interval.

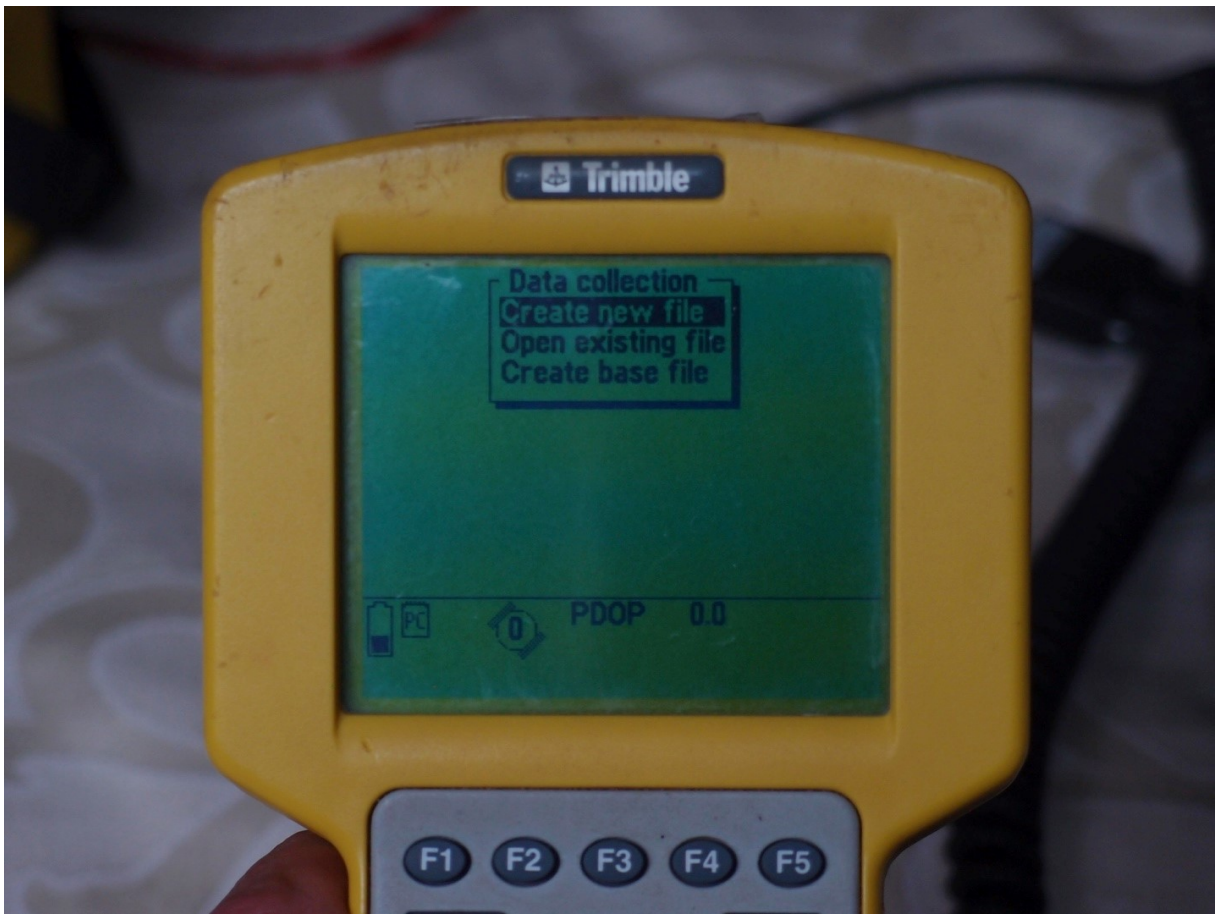


**Figure 6:** Navigate to Data Collection and create a new file. Either sort files by date (R031516 for Rover, March-15-2016) or by data element (terrace 1). Once this file is created we will log our data for the day in it. We can re-open the file with Open existing file, in case we turn the device off, but want to add more points to the file.

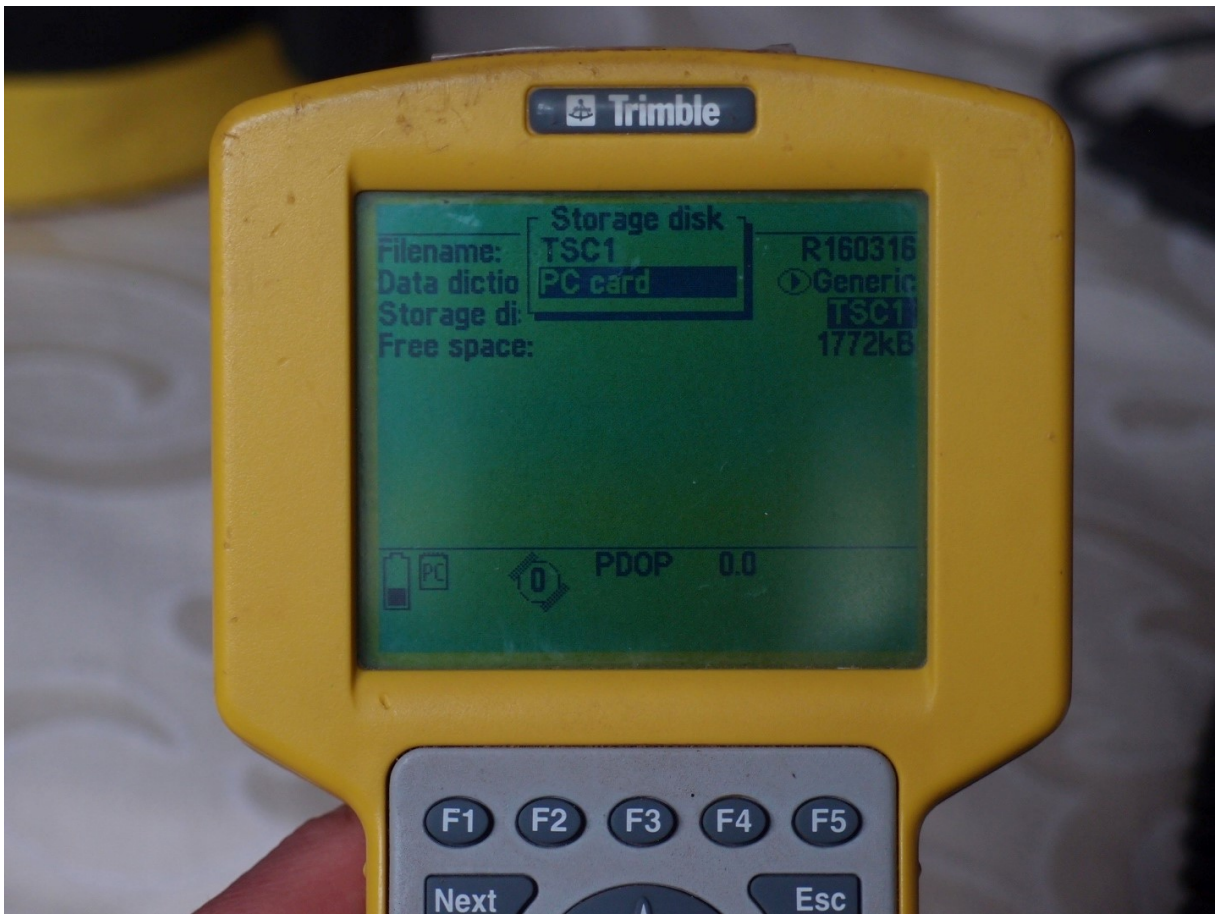


**Figure 7:** Make sure to store the data on the PC card (and not the TSC-1 memory).

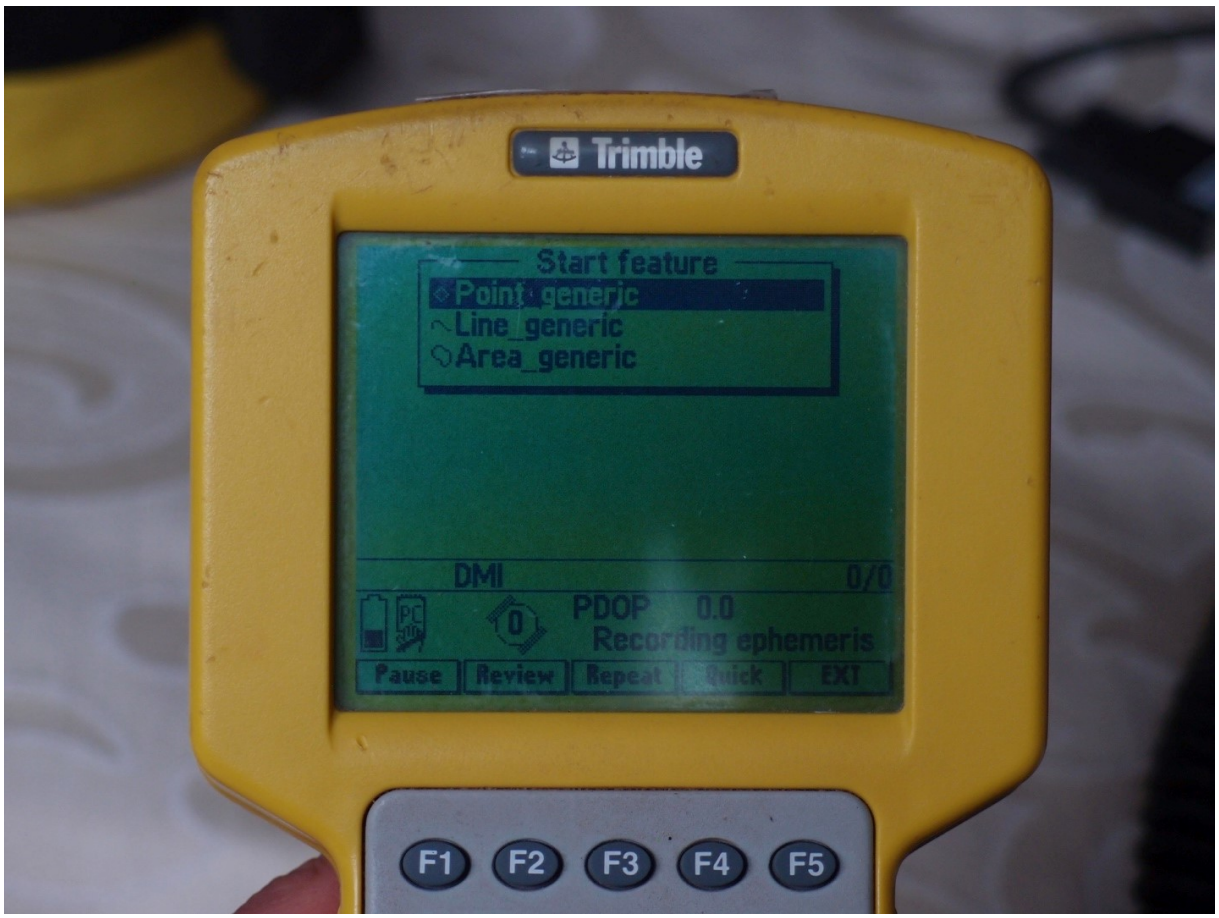


**Figure 8:** You want to generate point data and automatically log the data every 2 seconds (or so). When you are done logging the data press Enter to store the points in the file you created. Now it is safe to power off the device and take the data off onto a computer for further processing.

# 2 Downloading data from Trimble Pro XRS

## 2.1 Install Data Transfer Utility and Pathfinder Office

Install and open the Data Transfer Utility from Trimble (free program: http://www.trimble.com/datatransfer/). This program will transfer the data from the CF card in the TSC-1 unit to an SSF format, which can be converted to RINEX files in Trimble Pathfinder Office (email purinton@uni-potsdam.com if this program is not available to you).

## 2.2 Downloading data from TSC-1 with Asset Surveyor (5.2x) – PCMCIA or CF card

Use the following steps to transfer data from the CF card to the computer for the TSC-1 (Figure 9-12).


**Figure 9:** Open the TSC-1.


**Figure 10:** Remove the PCMCIA/CF card from the TSC-1 (look for the up label).


**Figure 11:** Remove the CF (Compact Flash) card.


**Figure 12:** Use the USB card reader with a CF slot to transfer all the files for the day to a folder on the computer.

## 3 Converting data to SSF and RINEX

Now that we have the files for the day, we can change them to SSF format with the Data Transfer Utility and then to RINEX in Pathfinder Office. RINEX files include observations (.obs) and navigation (.nav). Follow the steps in Figure 13-18).

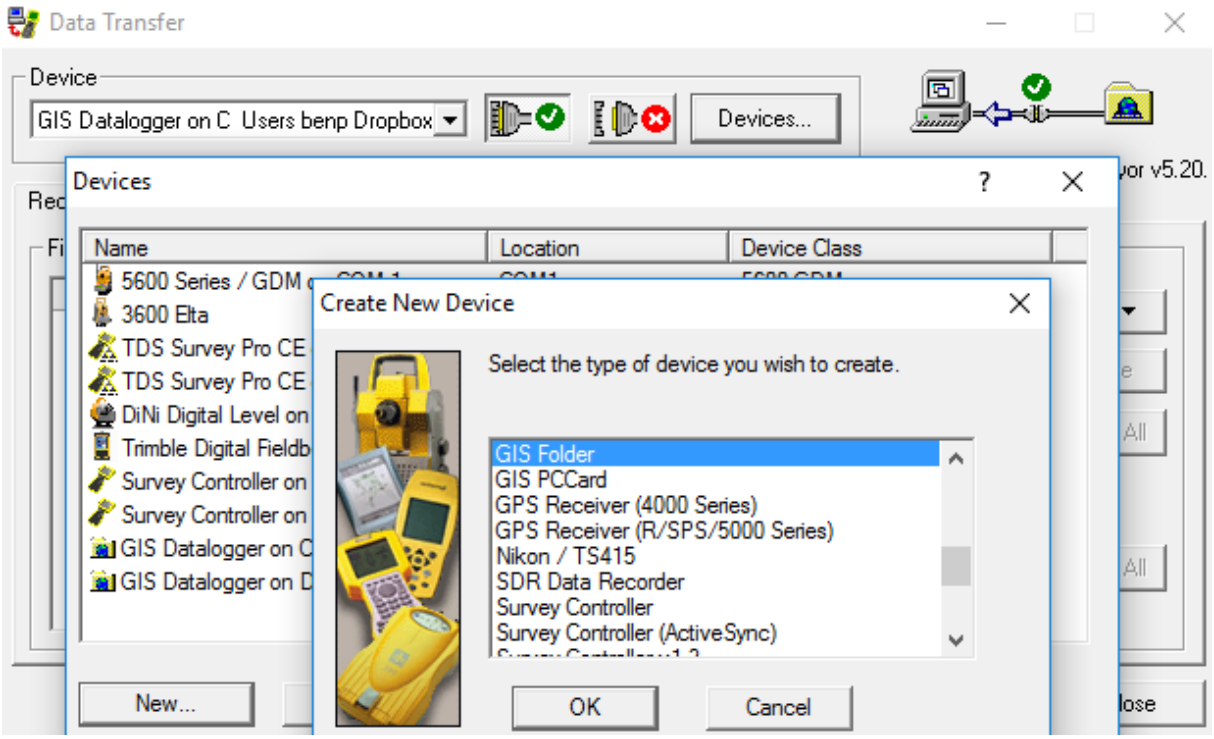


**Figure 13:** Open the Data Transfer Utility, select Devices>New. Create a New Device as a GIS Folder.

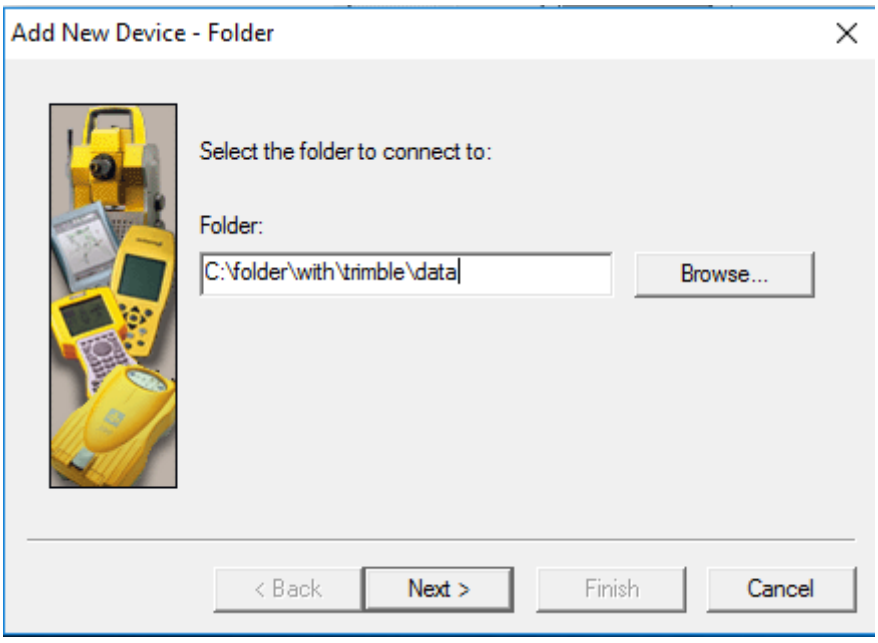


**Figure 14:** In the next step, select the folder where you transferred the daily data to.

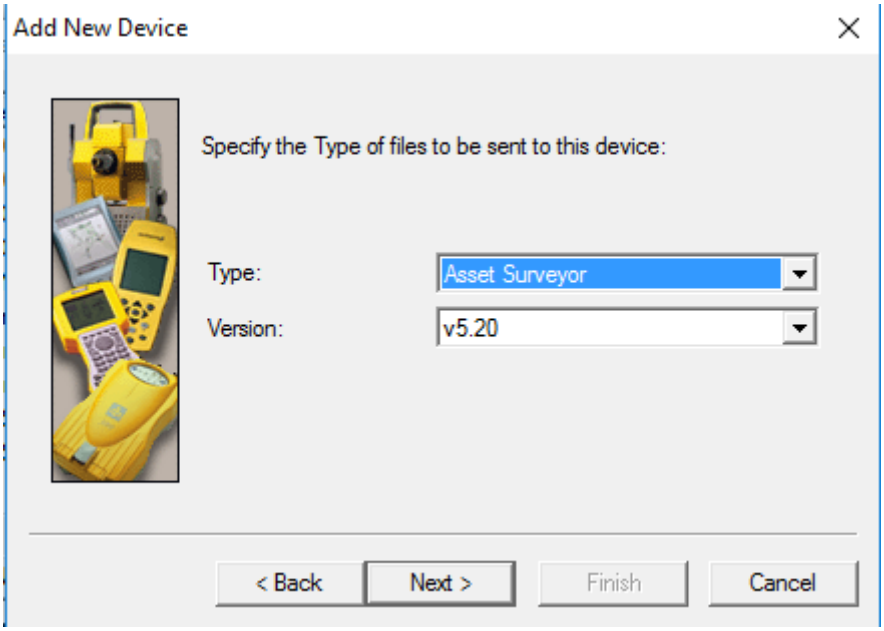


**Figure 15:** Select Asset Surveyor and version 5.2. Then finish on the next screen.

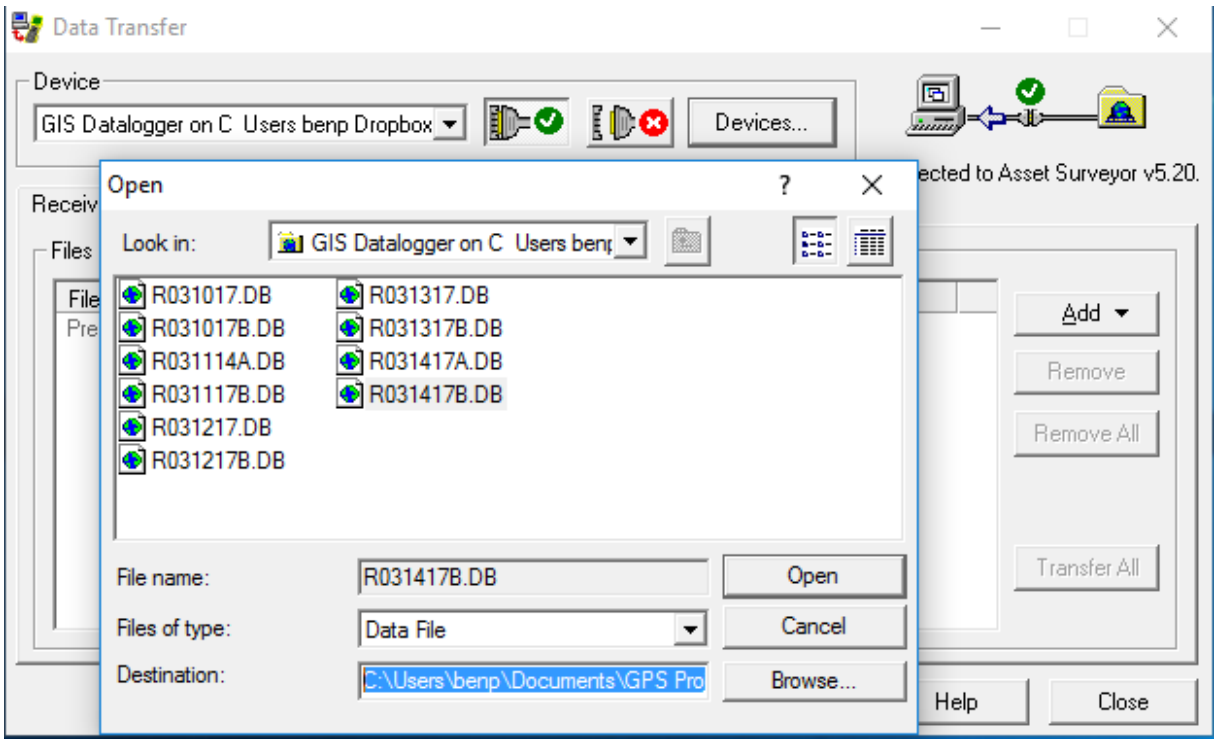


**Figure 16:** Now we have a new device in the menu. We connect to the device with the green check-mark. Then we use Add to select the data files. We choose the Destination somewhere that we want the SSF files to go. After we select the files and the destination, we use Transfer All to convert the files to SSF. Now we can convert from SSF to RINEX in Pathfinder Office.

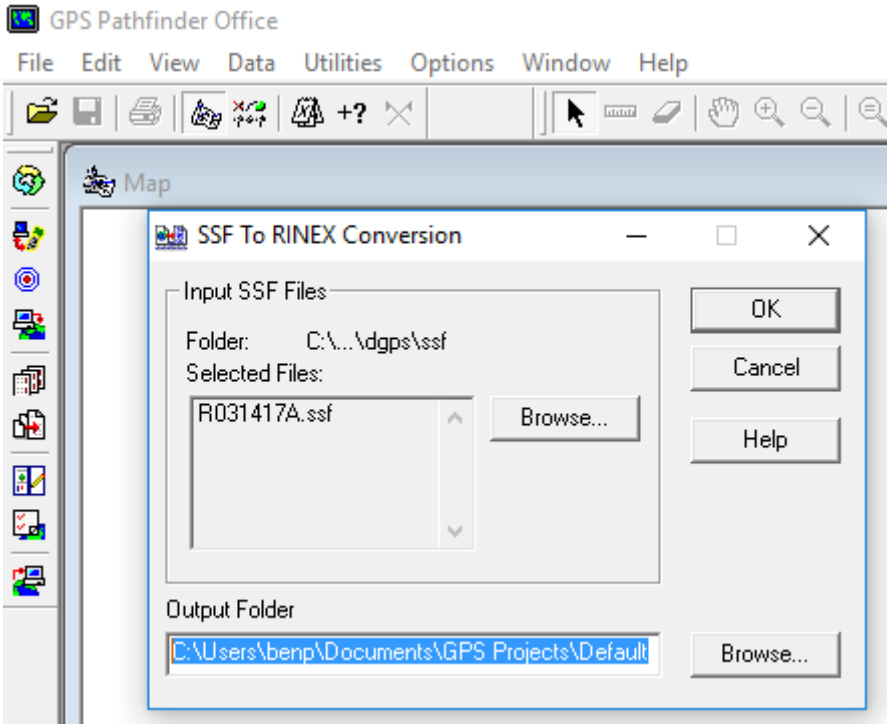


**Figure 17:** Open Pathfinder Office and go to Utilities>Other>SSF to RINEX. Select the SSF file we want to convert and choose a destination folder where the RINEX files will go. Now click OK.

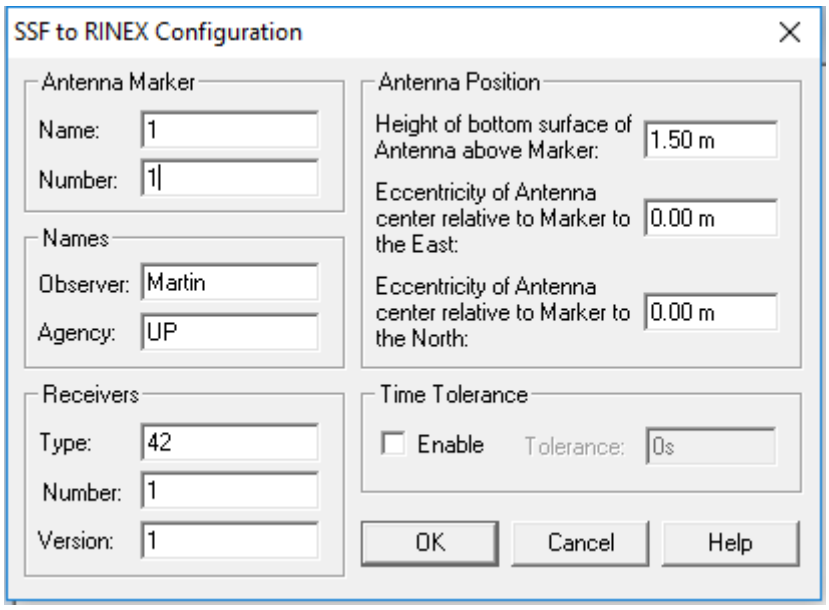


**Figure 18:** In this step we need to fill in information about the data collection. The most important information is the Observer (who took the data) and the Antenna Height. The Antenna Height should be automatically read from the SSF file, but make sure the height is correct. Once we press OK here, the SSF files will be converted to RINEX files in the destination folder and we are ready to correct the data in RTKLIB: **See second manual *dGPS Correction with RTKLIB***.