

Using a Drone, ZEB-REVO Laser scanner and DGPS in the field

Packing list:

- ZEB-REVO hand-held laser scanner
- DJI Phantom 3 Advanced
- DGPS
- Laptop / smartphone / tablet with Wi-Fi capabilities
- 2D markers for drone
- 3D markers for laser scanner
- Pegs

Before leaving to the survey area, gather all the equipment that you will be using during the survey. This includes the drone and its accessories (check the packing list in the Drone quick-start manual), the ZEB-REVO laser scanner and its accessories (check the packing list in the ZEB-REVO manual) and the DGPS and its accessories (check the packing list in the DGPS manual). Make sure to bring plenty of 2D and 3D markers with you. Instructions on size and quantity of 2/3D markers can be found in the ZEB-REVO and drone manuals). Make sure that you have a plan ready for the path that you will be walking with the ZEB-REVO and a flight plan for the drone. Instructions on how to make these plans can be found in the respective manuals of the devices. Also check the weather forecast. Consult the manuals to find out what are the best/worst circumstances.

Once in the field, start by verifying your drone flight plan and the ZEB-REVO walking path; are they feasible? If the answer is no, change the plan to one that can be executed. If the answer is yes, proceed by marking the borders of your survey area with 2/3D markers according to the instructions in the ZEB-REVO quick-start manual. Next, set up the DGPS base in the middle of your survey area according to instructions in the DGPS quick-start manual (use your ZEB-REVO walking path and drone flight plan to verify the position of the base and markers). Set-up all the remaining 2/3D markers. Make sure to fix all the 2D markers securely to the ground using pegs or whatever you can find in the field (stones, sticks).

Once the survey area is set-up, you can start measuring the exact positions of the 2D markers using the DGPS. It is advisable to give the measurement the number of the marker. In the meantime, others can start setting up and calibrating the drone and/or setting up and connecting the ZEB-REVO. It is recommended to do a short test flight with the drone covering the full survey area. The test flight will give a valuable insight on whether the 2D drone markers are clearly visible on the pictures and whether the camera settings give clear and consistent pictures. This is extremely important on e.g. slightly overcast days on which light conditions are constantly changing. Adjust the camera settings (e.g. exposure, ISO values) accordingly.

During the test flight, it is possible to finish your first ZEB-REVO loop as the drone pictures won't be used as data anyway. Follow the ZEB-REVO quick-start guidelines on how to do a survey with the ZEB-REVO. This first loop should be saved and the preview should be inspected carefully to check whether the data makes sense; is there enough overlap between the paths? Are the 3D markers clearly visible? How long did it take to finish one loop? How much battery was used? Make adjustments accordingly.

While checking the ZEB-REVO data, you can start your first actual drone survey. Make sure that everybody stays outside of the survey area while flying. After the drone survey is done, make sure to check the pictures. In the meantime, someone can do the second ZEB-REVO loop. After the loop, check the ZEB-REVO data and start another Drone survey (if needed). You can repeat these steps until the whole survey area is covered.