Digital mapping in extreme and remote environments

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During the last few years, Luleå University of Technology has performed a series of research projects in remote areas with extreme climatic conditions using digital mapping technologies. The majority of past and ongoing research projects focus on the arctic regions of the Fennoscandian Shield and Greenland but also on the Zagros fold-and-thrust belt in northern Iraq. Currently, we use the Midland Valley application FieldMove on iPad mini devices with ruggedized casings. As all projects have a strong focus on geological field work, harsh climatic conditions are a challenge not only for the geologists but also for the digital mapping hardware. In the arctic regions especially cold temperatures affect battery lifetime and performance of the screens. But also high temperatures are restricting digital mapping. From experience, a typical temperature range where digital mapping, using iPad tablets, is possible lies between -20 and +40 degrees. Furthermore, the remote character of field areas complicates access but also availability of electricity. By a combination of robust solar chargers and ruggedized batteries we are able to work entirely autarkical. Additionally, we are currently installing a drone system that allows us to map outcrops normally inaccessible because of safety reasons or time deficiency. The produced data will subsequently be taken into our Virtual Reality studio for interpretation and processing. There we will be able to work also with high resolution DEM data from Lidar scanning allowing us to interpret structural features such as post-glacial faults in areas that are otherwise only accessible by helicopter. By combining digital field mapping with drone technique and a Virtual Reality studio we are able to work in hardly accessible areas, improve safety during field work and increase efficiency substantially.