

Correcting UAV derived winter snow depth on glaciers by modelling the evolution of the No-Snow glacier surface

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Measuring winter accumulation on glaciers using UAVs

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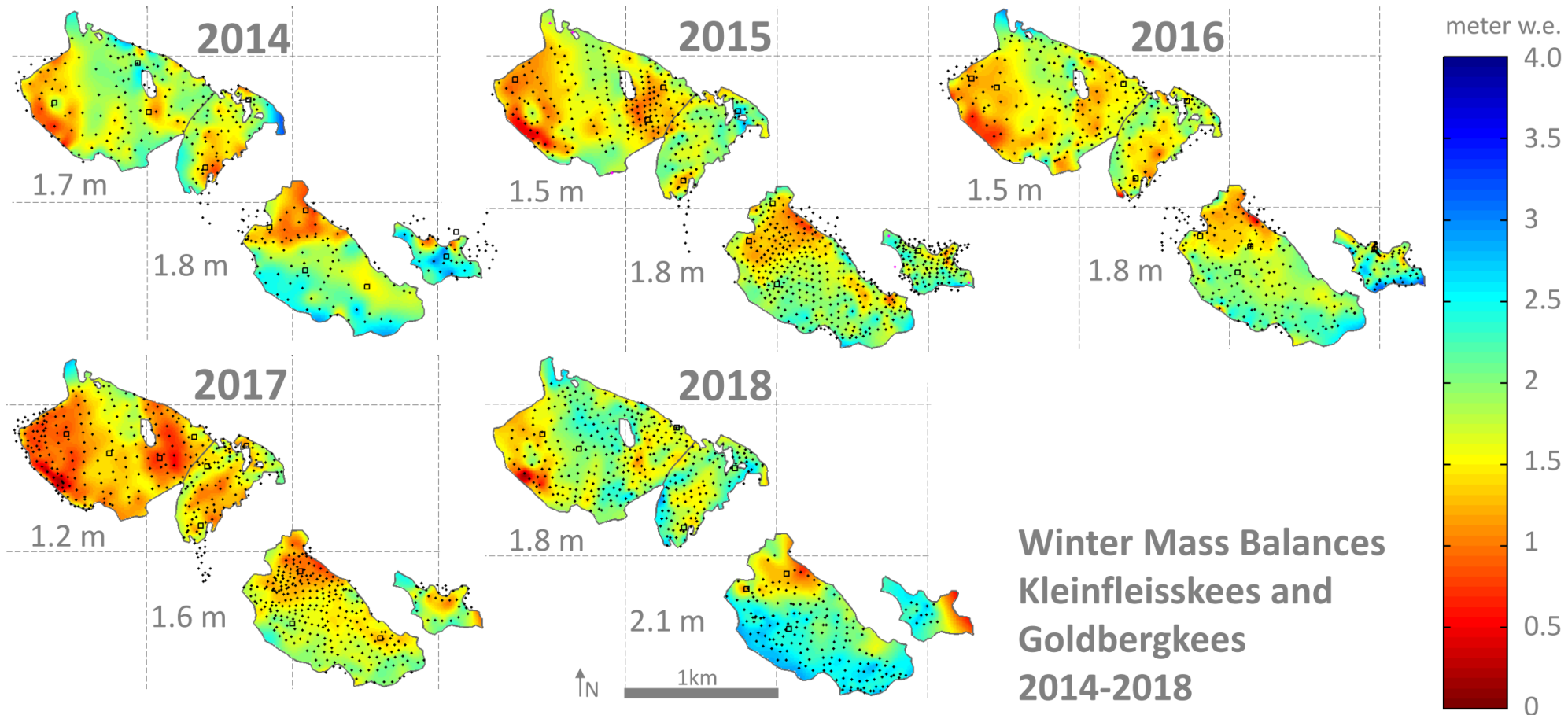
² ZAMG, Sonnblick Observatorium, Salzburg, Austria

³ Institut für Geographie und Raumforschung, Universität Graz, Graz, Austria

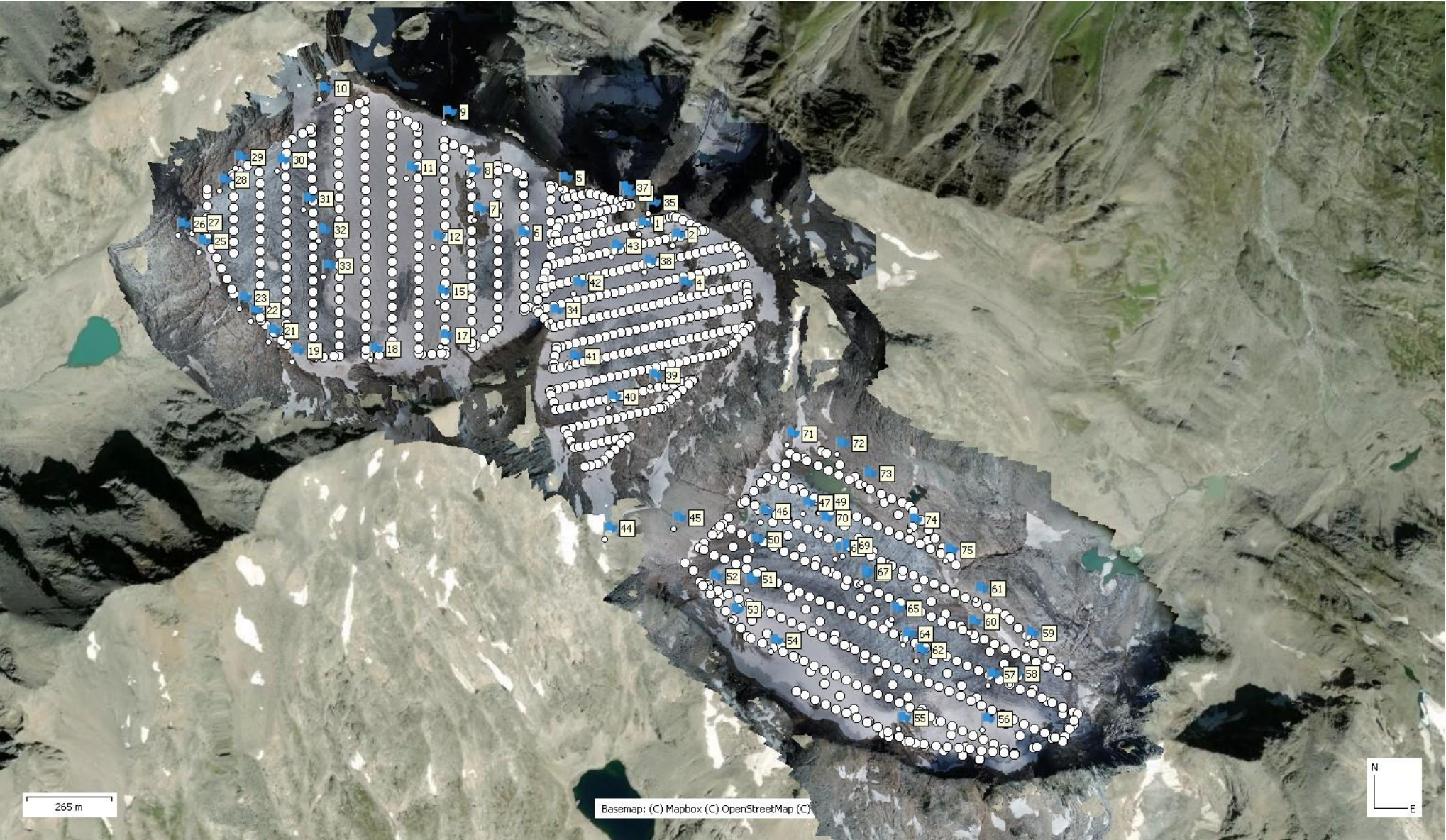


Motivation

- **Spatially distributed winter snow accumulation** is important key variable in glacier monitoring
- Usually measured by manual snow probing or ground penetrating radar and spatial extrapolation
- Using UAVs is less time consuming, and delivers a better spatial coverage



Methods : structure from motion photogrammetry



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Folie 4



Phantom 4 RTK

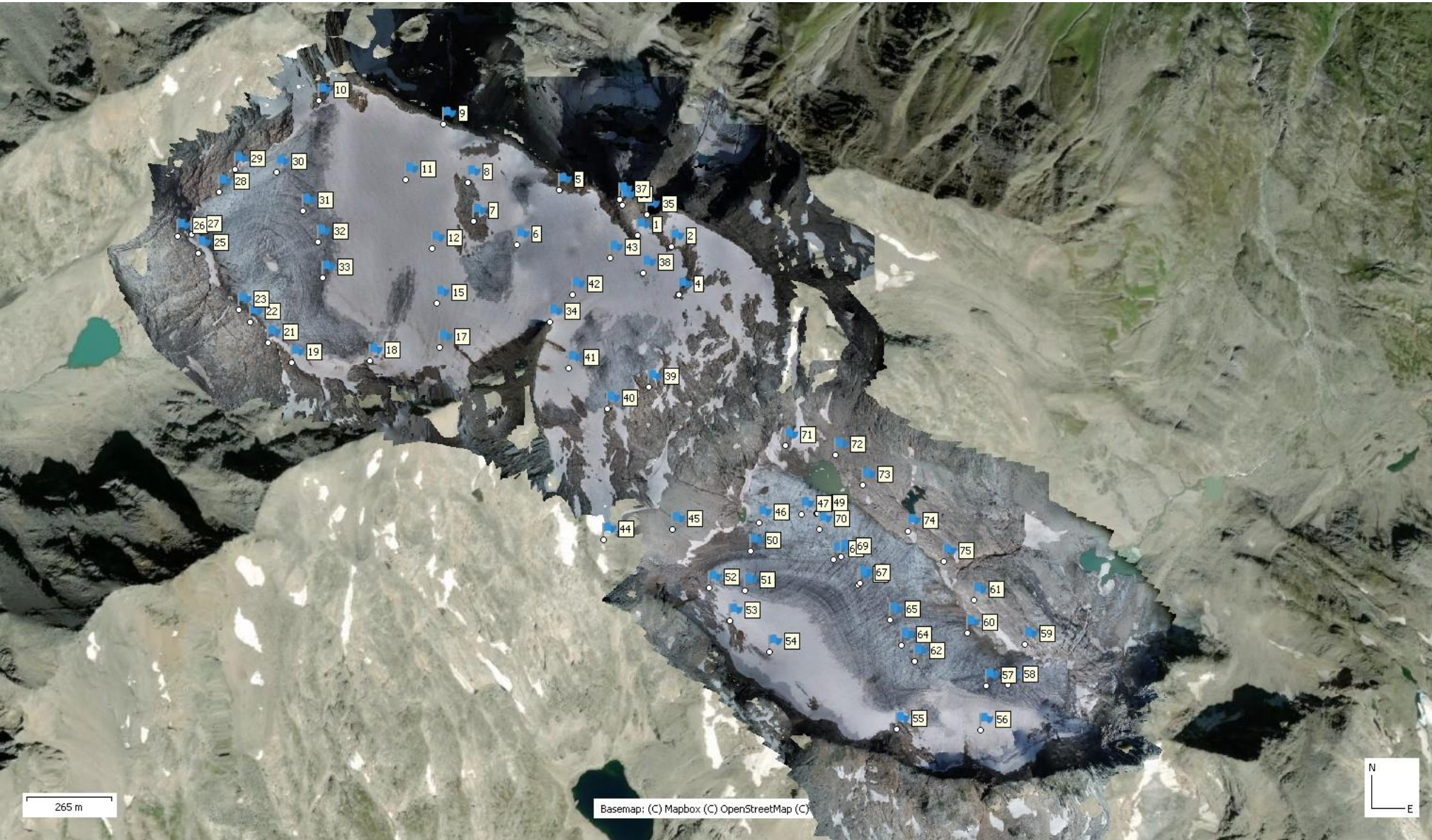


Methods : structure from motion photogrammetry

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Folie 5



Phantom 4 RTK



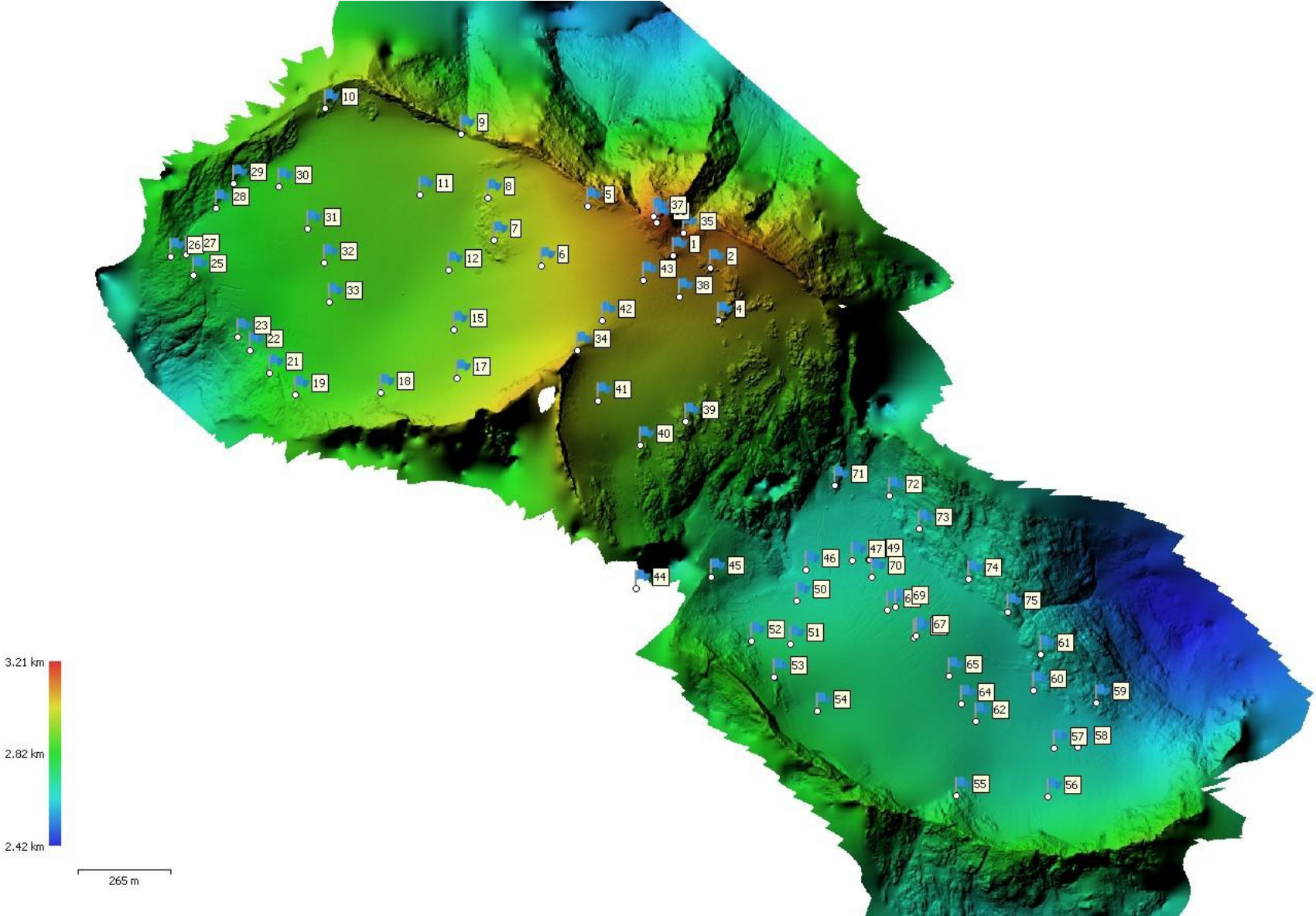
Methods : structure from motion photogrammetry



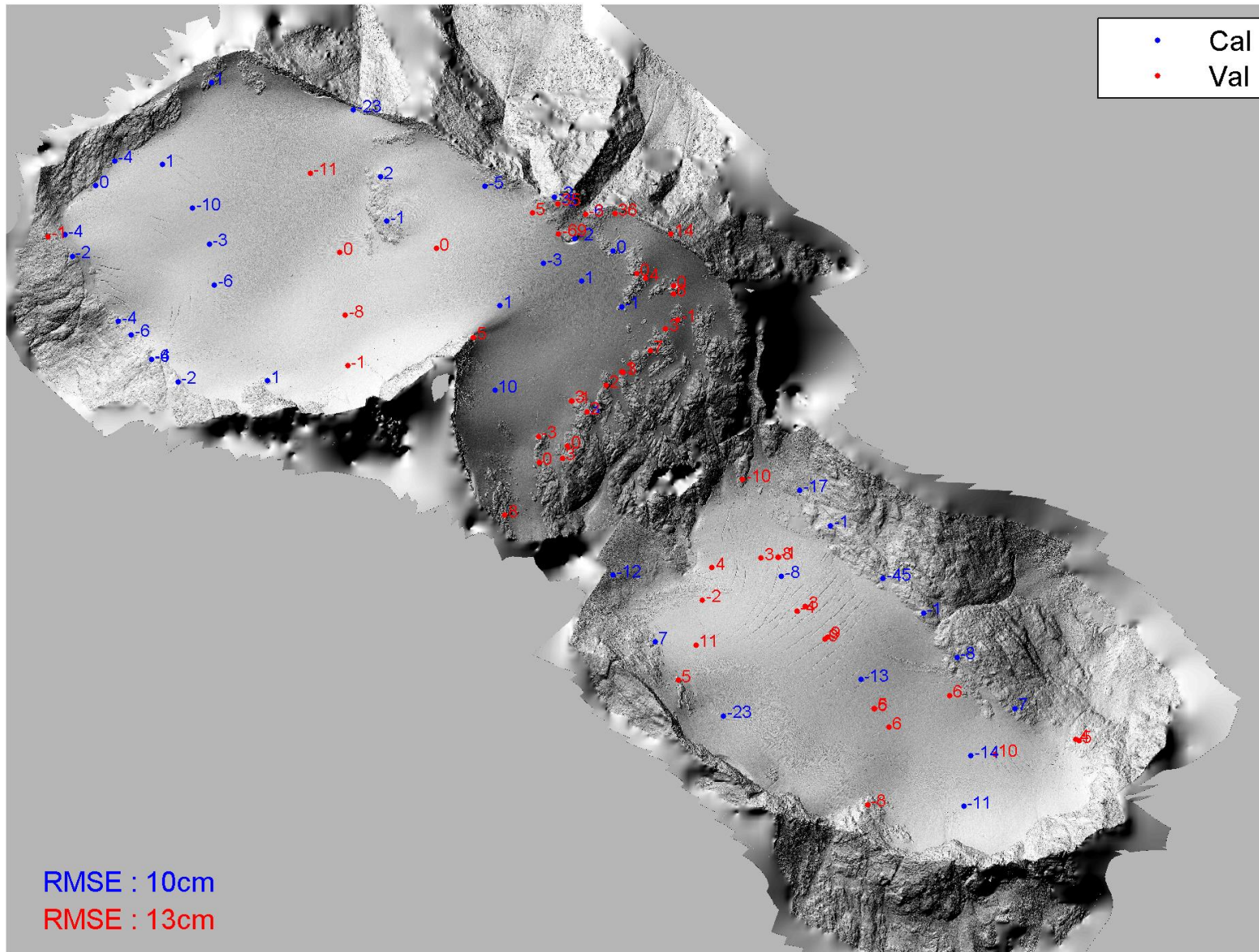
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Folie 6



Phantom 4 RTK



Methods : structure from motion photogrammetry



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Folie 7

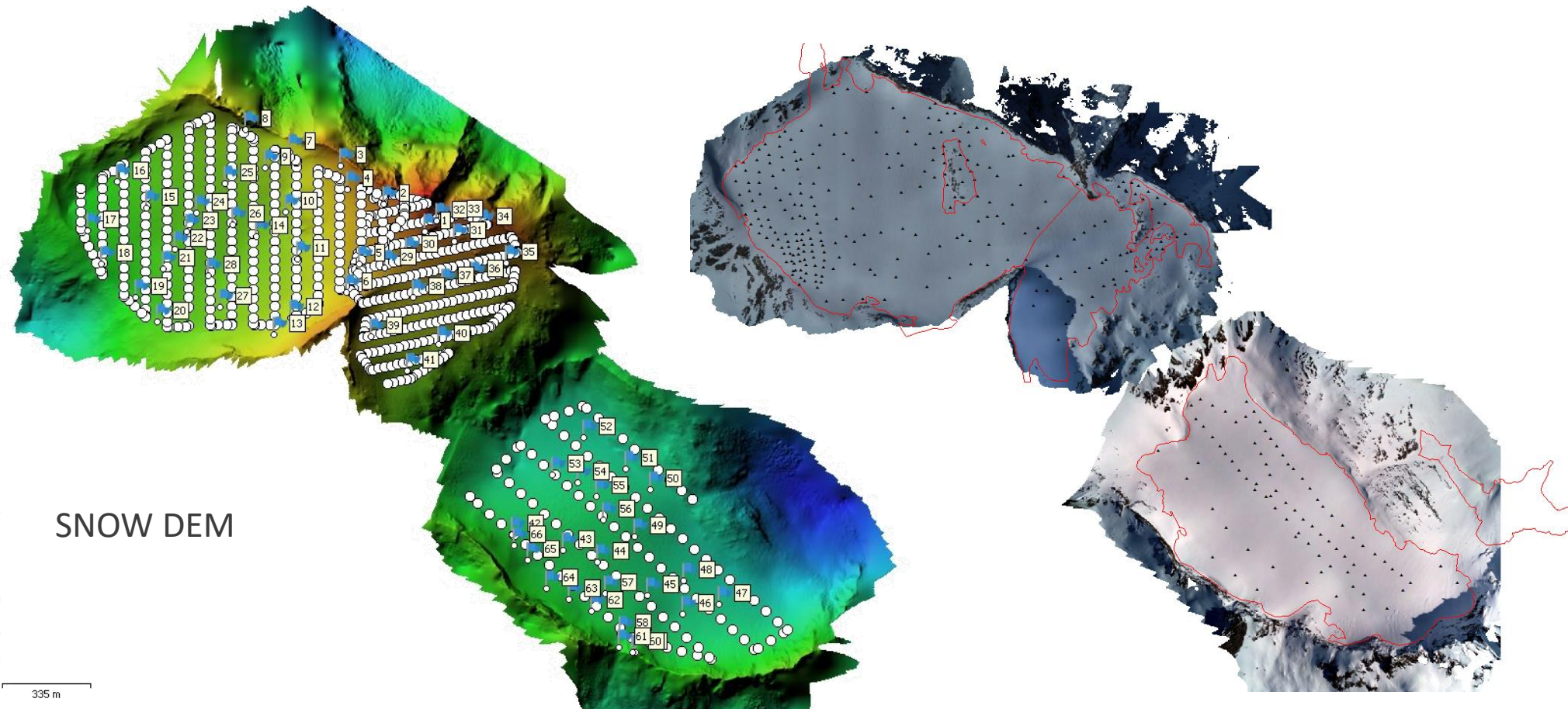


Phantom 4 RTK



Methods : structure from motion photogrammetry

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Folie 8



Phantom 4 RTK



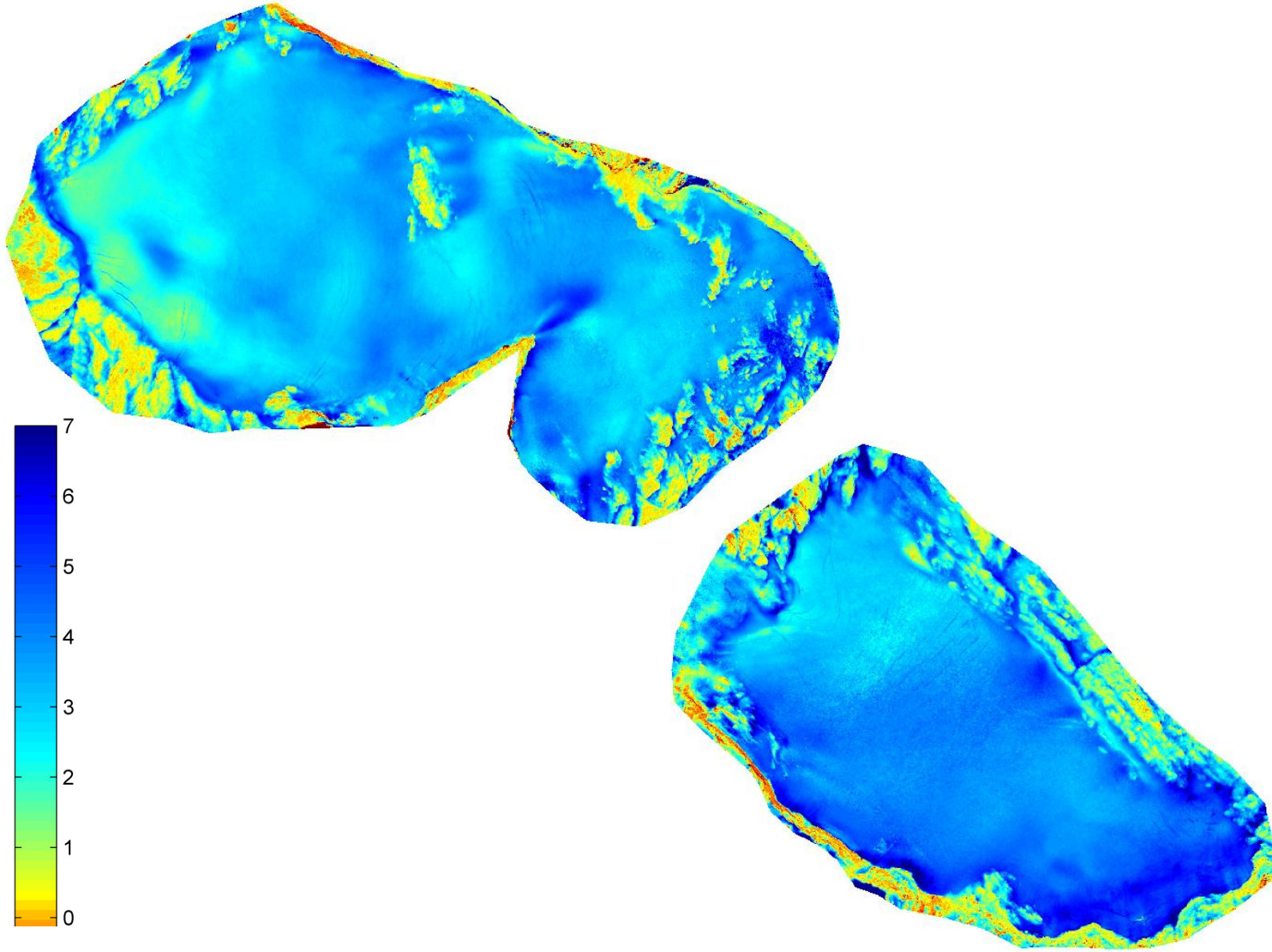
Result : Snowdepth by differencing of DEMs (DOD)



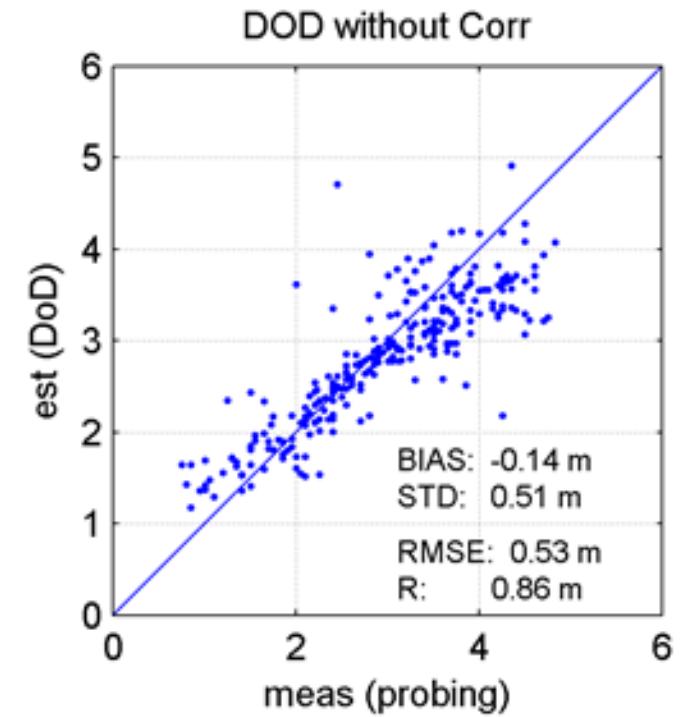
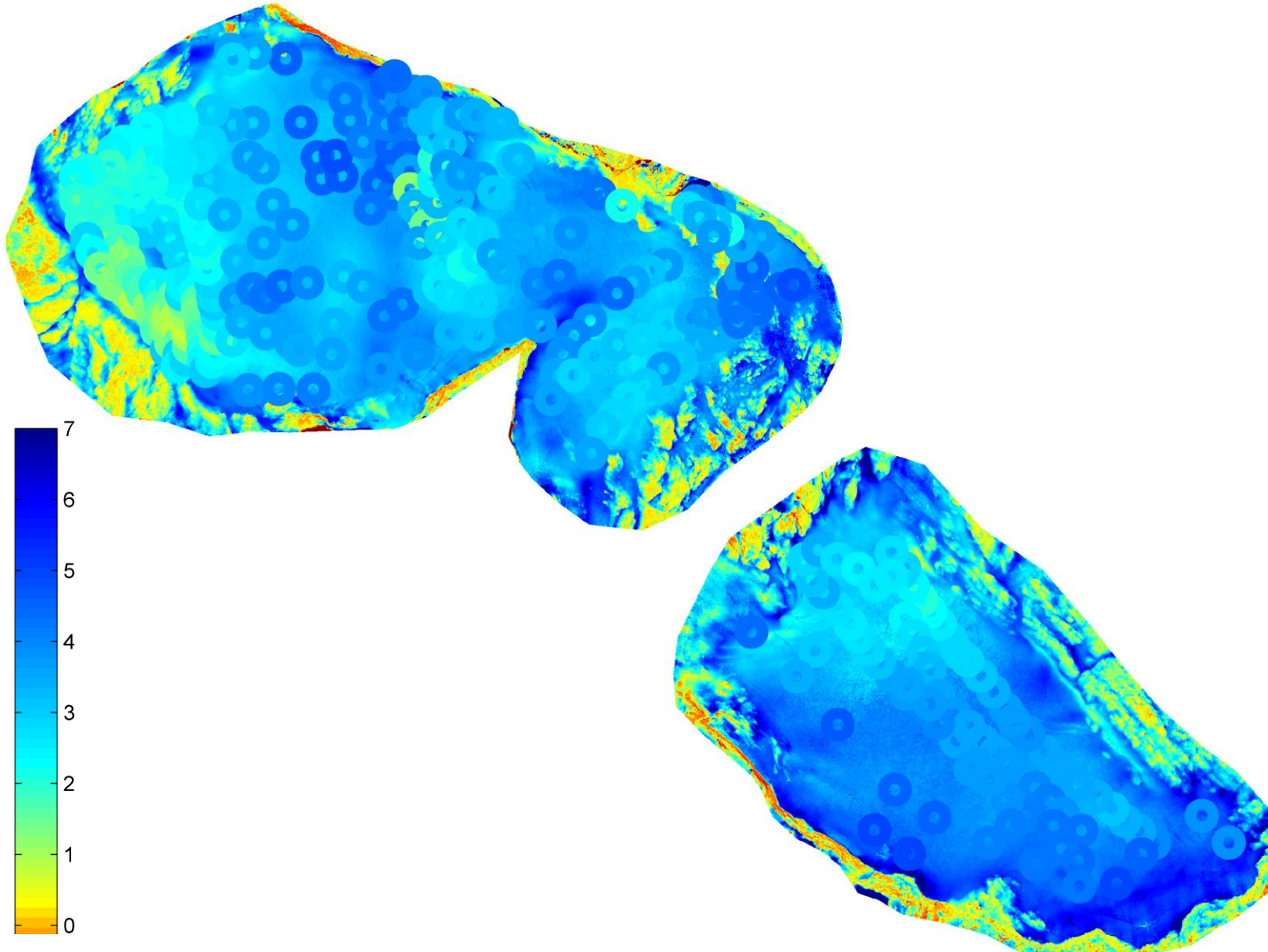
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Folie 9



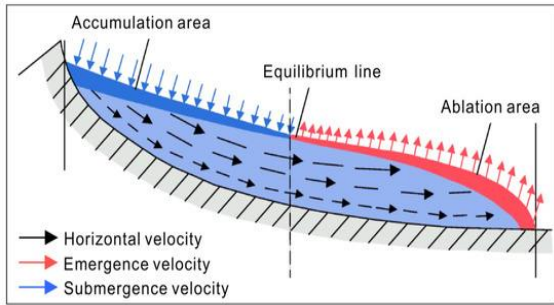
Phantom 4 RTK



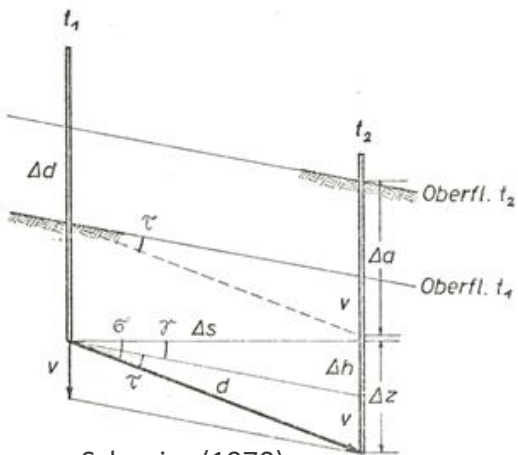
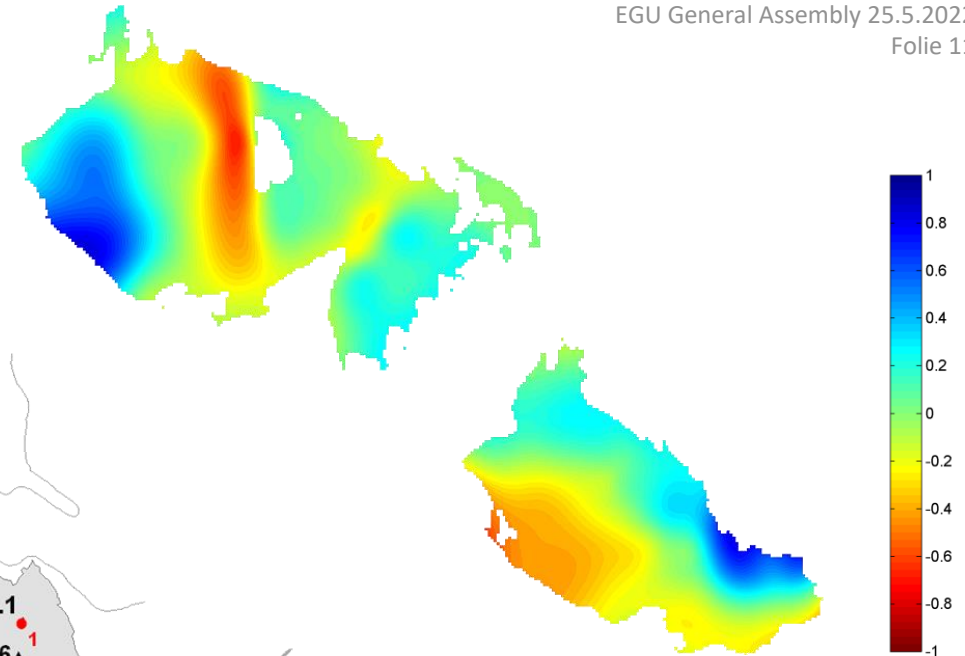
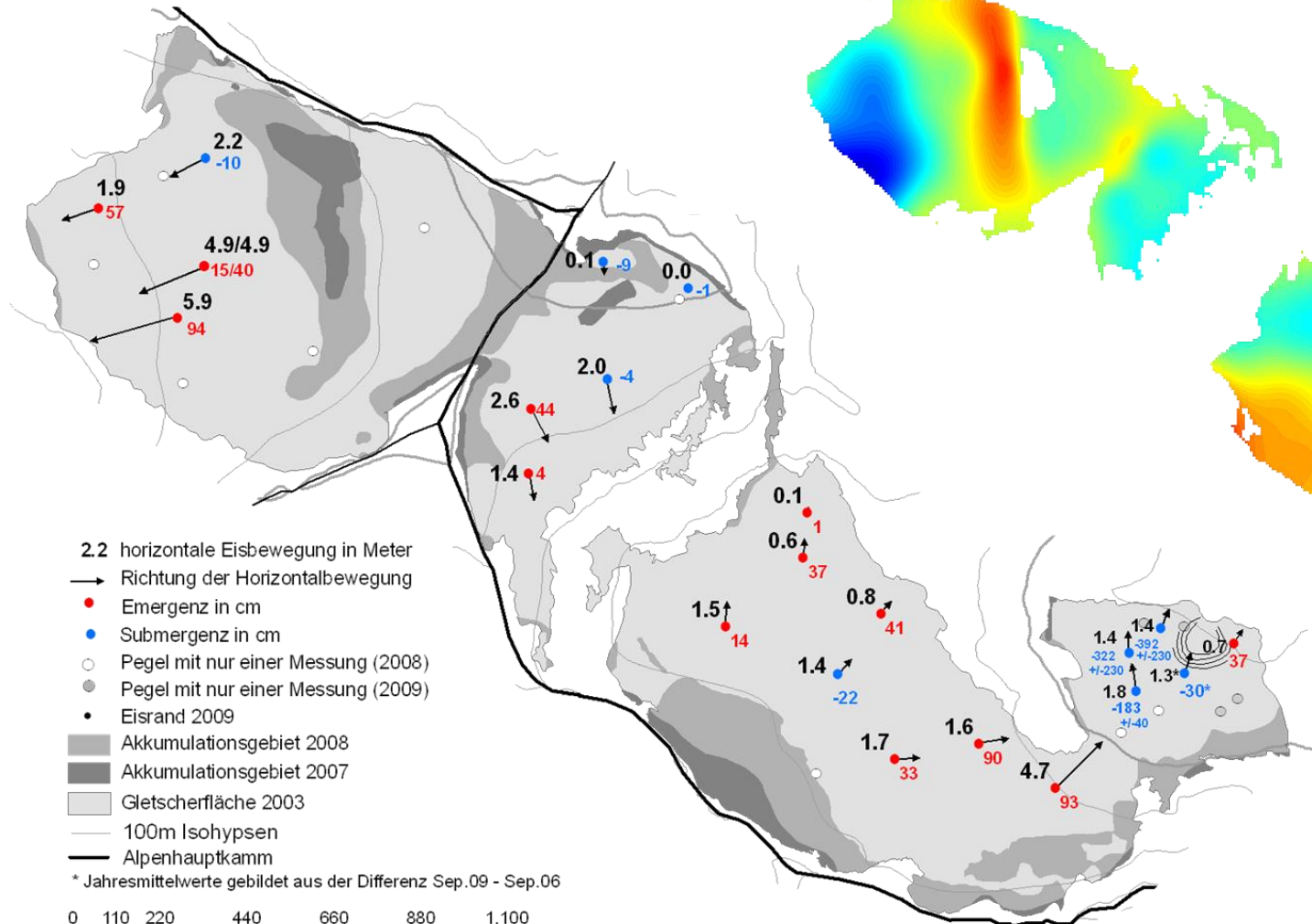
Methods : Validation: Manual snow depth probings



Methods : Correction for vertical component of ice movement



Chunhai et al., 2021



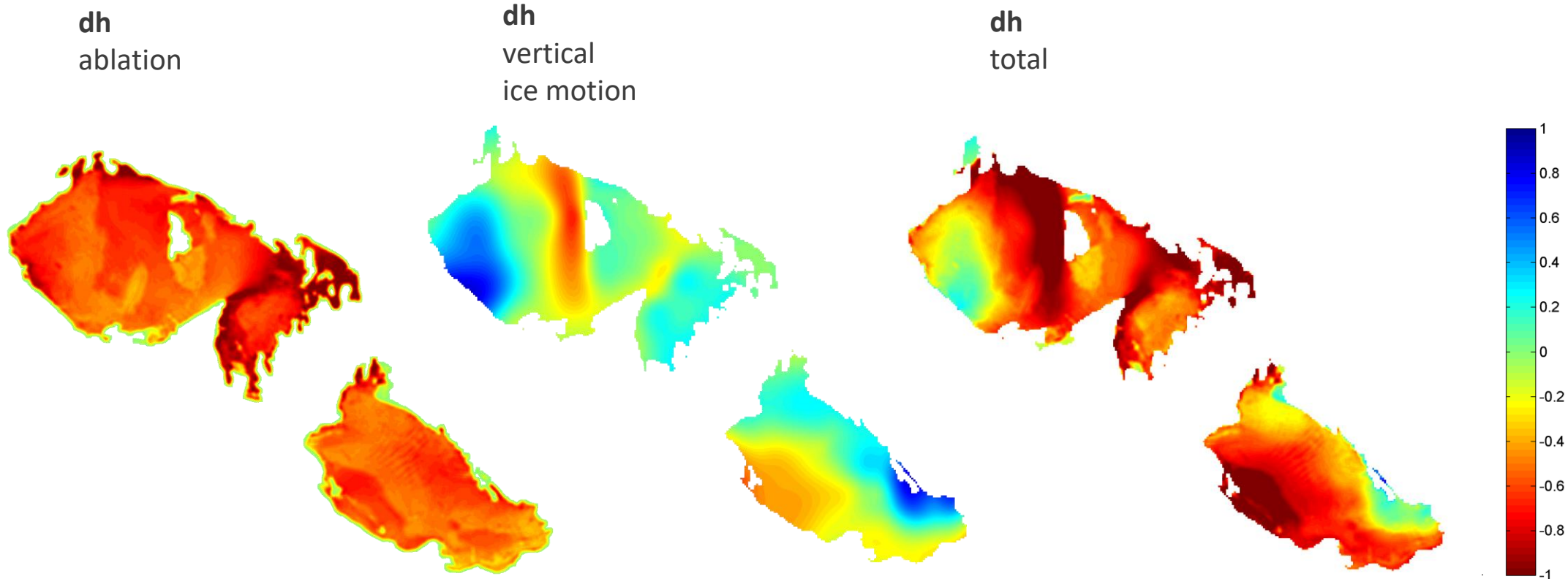
Schneier (1970)

0 110 220 440 660 880 1,100
Meter

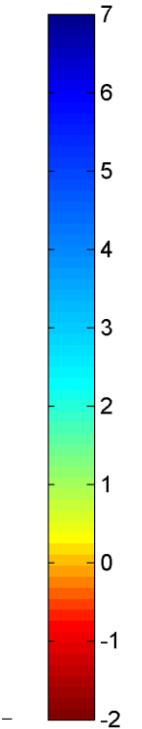
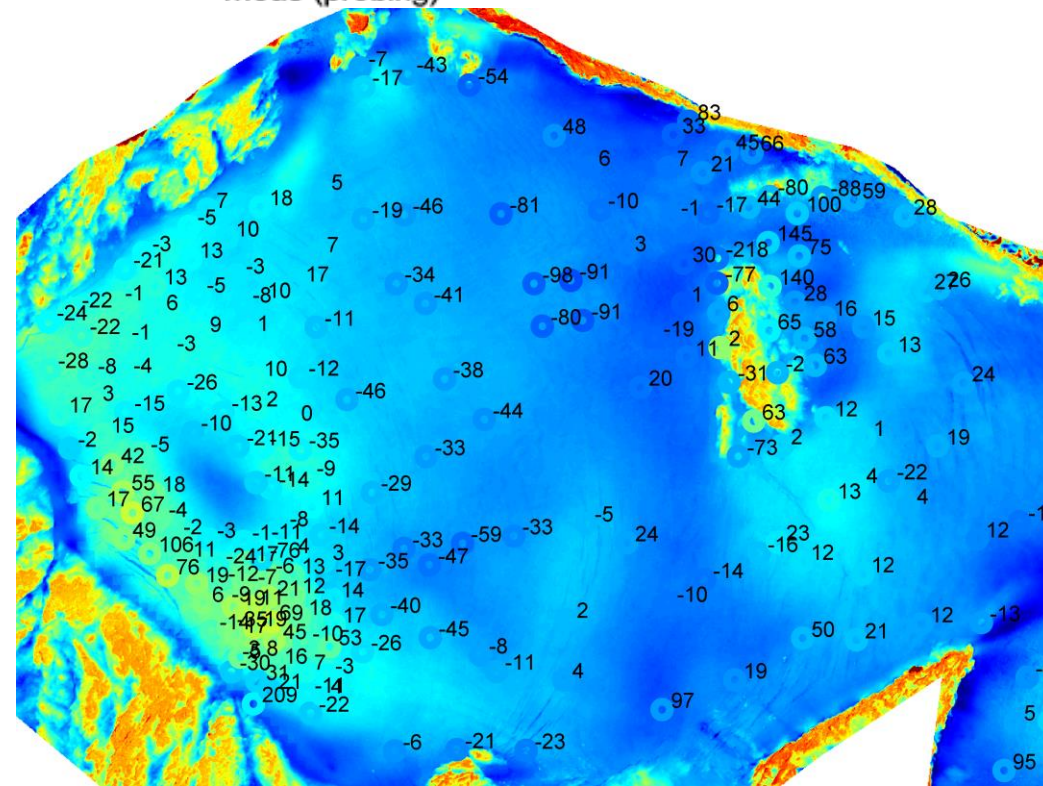
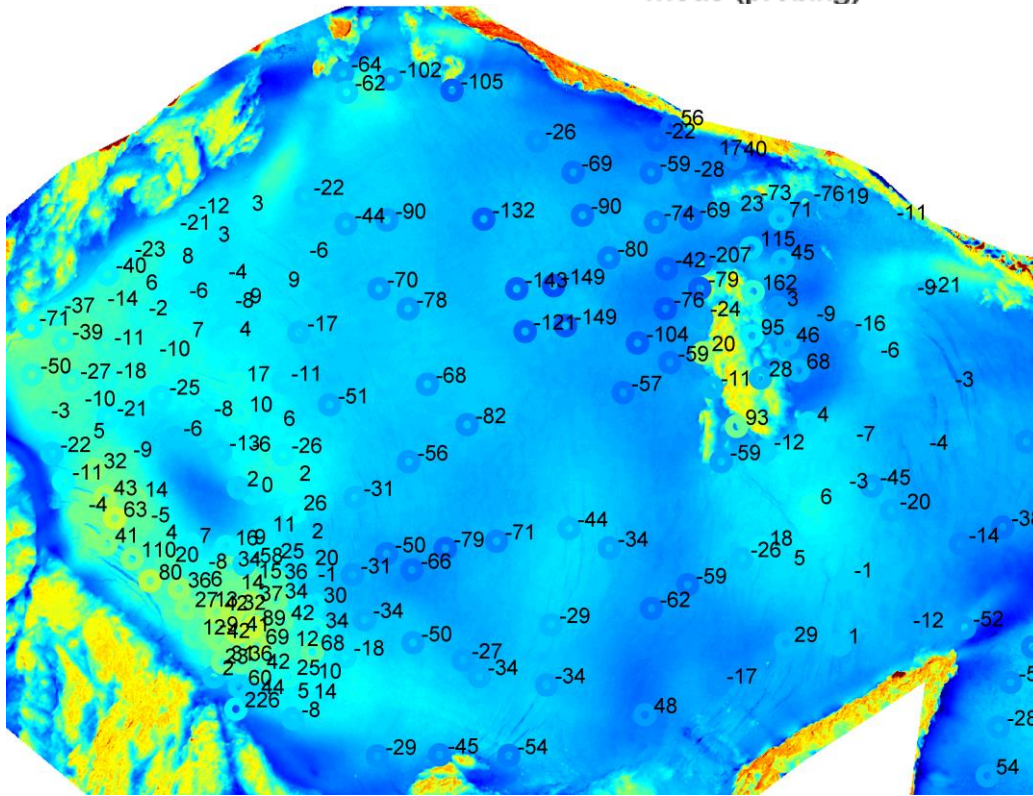
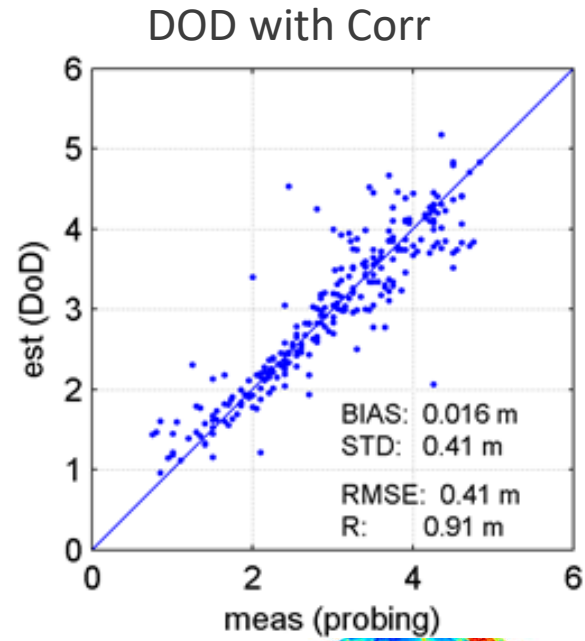
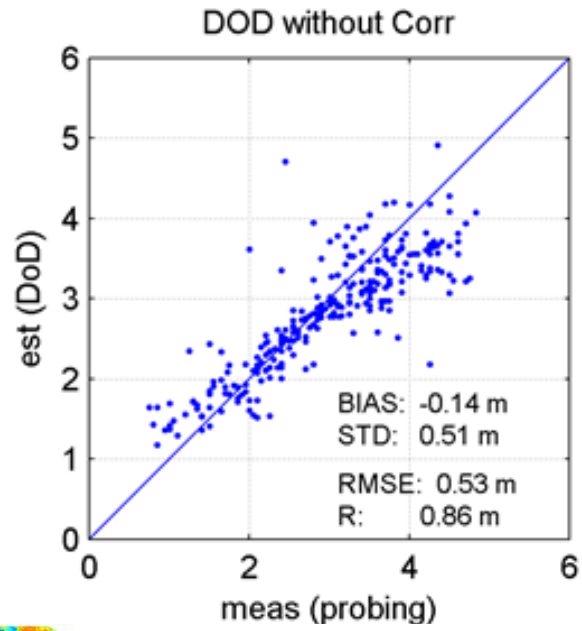
Methods: Correction for Ablation and Sub- Emergence



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Results





Thanks for your attention!