Karlsruhe Institute of Technology

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EFTAS Remote Sensing Transfer of Technology

Identification of drained areas for enhanced precision in regionalized emission modeling

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Background

- Drainage systems in agricultural areas have an impact on substance transfer to surface water bodies.

Knowledge gap

- Few spatial data about drained areas is available.
- Existing approaches in regionalized emission modelling stick to generalized statistic assumptions regarding drained shares in agricultural lands.

Methods

- As indicator for drained or undrained areas, the ground movement is measured using Multi-Temporal interferometric Synthetic Aperture Radar (MTInSAR).
- Resolution: 30 m
- Underlying assumptions:
  - In drained areas, the shrinking process of the ground is faster than in undrained areas.
  - The movement of ground height reflects the shrinking process.

Test area – Fremdingen, Bavaria

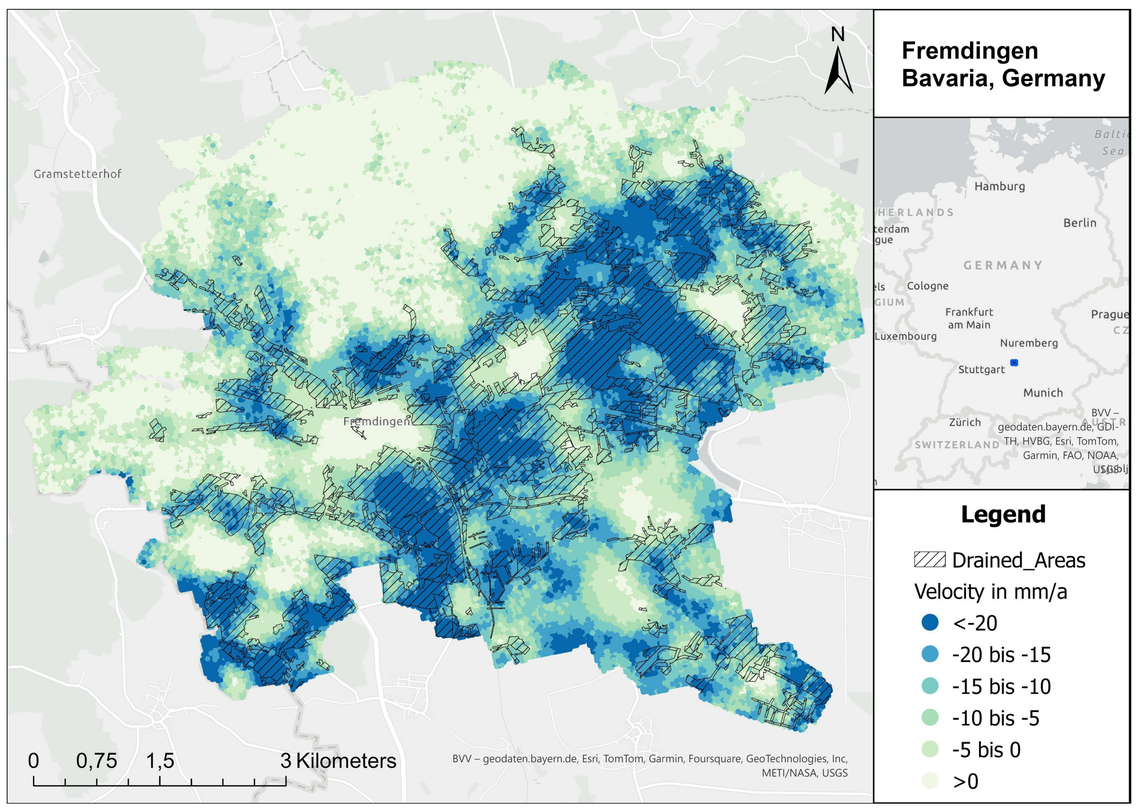

Abb. 1: Map of the Gemeinde Fremdingen – Velocity and drained areas

Results

- Spatial hotspots of high velocities match with drained areas.
- Considering land use, a pattern is discovered:
  - Pasture areas show lower velocities than arable lands
- Still for both land use types, the cumulative frequency of high velocities in drained areas is higher than in undrained areas.

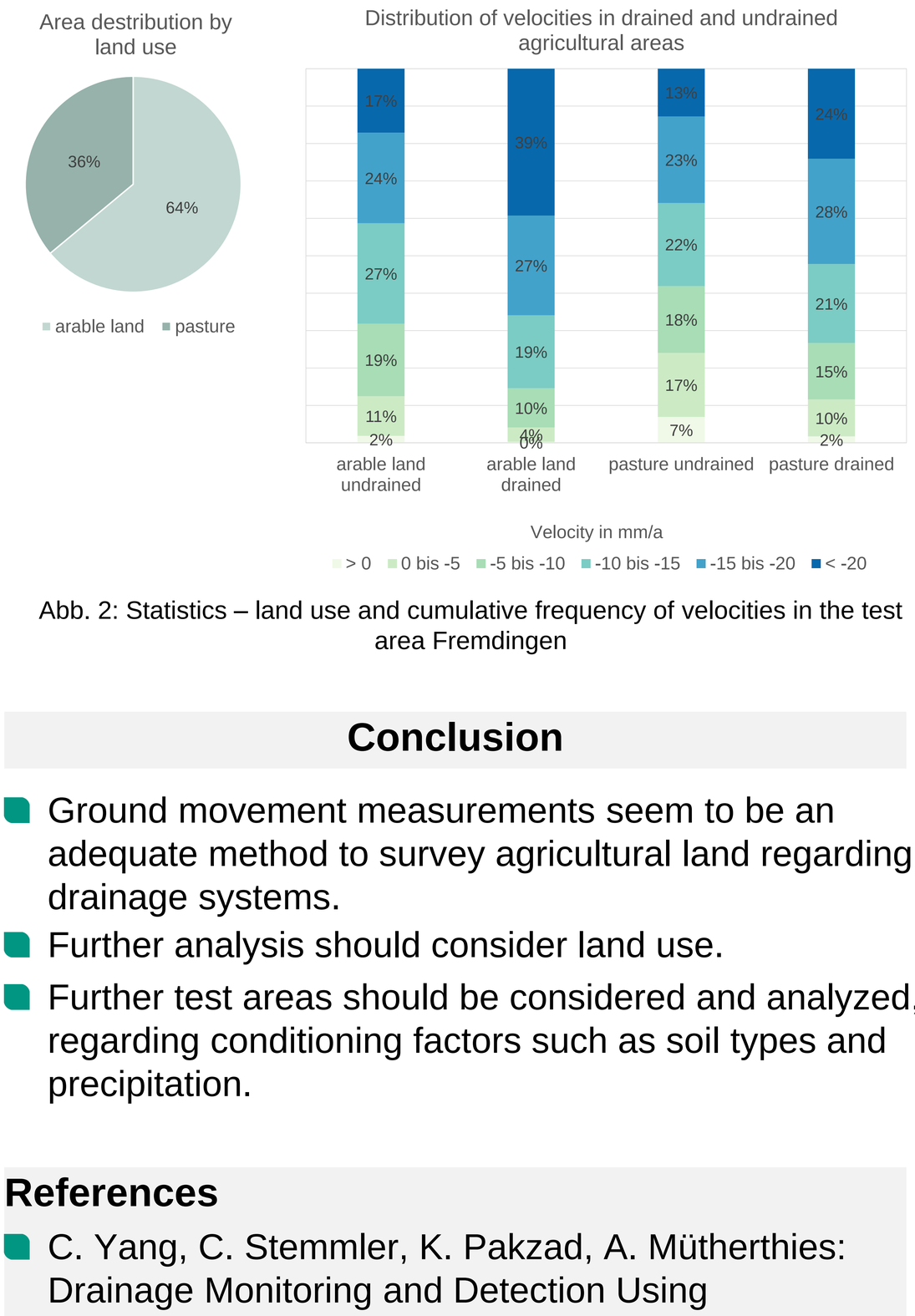

Abb. 2: Statistics – land use and cumulative frequency of velocities in the test area Fremdingen

Conclusion

- Ground movement measurements seem to be an adequate method to survey agricultural land regarding drainage systems.
- Further analysis should consider land use.
- Further test areas should be considered and analyzed, regarding conditioning factors such as soil types and precipitation.

References

- C. Yang, C. Stemmler, K. Pakzad, A. Mütherthies: Drainage Monitoring and Detection Using Spaceborne MTInSAR, unpublished

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