

Soil Moisture Retrieval at L-Band

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Motivation

Key Questions of the Hydrosphere

1. How do the spatial and temporal dynamics of soil moisture contribute to soil and plant transpiration?
2. How does this affect the exchange of water and energy between the soil and the atmosphere?
3. How do soil moisture patterns influence the formation of new ground water, surface run-off and soil water storage in moderately large river basins?
4. How strong is the link between spatiotemporal changes in soil moisture and changes in regional climate (and weather)?

Approach



- SAR data over particular areas of interest with high temporal and spatial resolution
 - Frequencies at L-Band → Penetration into vegetation and soil
 - Single-pass interferometry with different baselines
 - Full-polarimetric data acquisition
- +
- Forward models for EM scattering by vegetation and soil with various moisture content → dielectric constant

Pol-SAR

Fully polarimetric SAR data is used to invert electromagnetic models for soil parameters, such as soil dielectric and soil roughness.

→ High temporal acquisition sampling required for continuous monitoring.

D-In-SAR

Differential Interferometry combines acquisitions on different dates with a zero spatial baseline. The differential phase is a very sensitive observable to soil moisture changes.

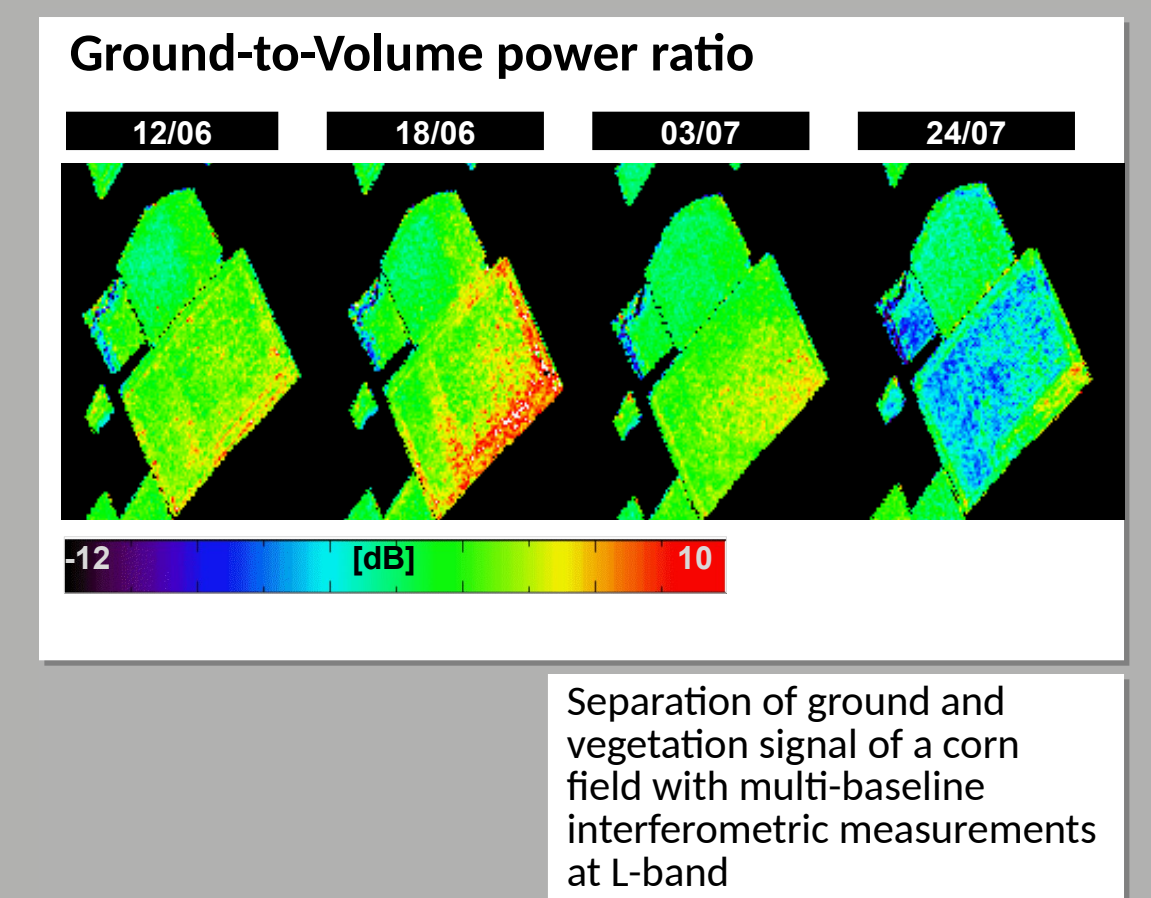
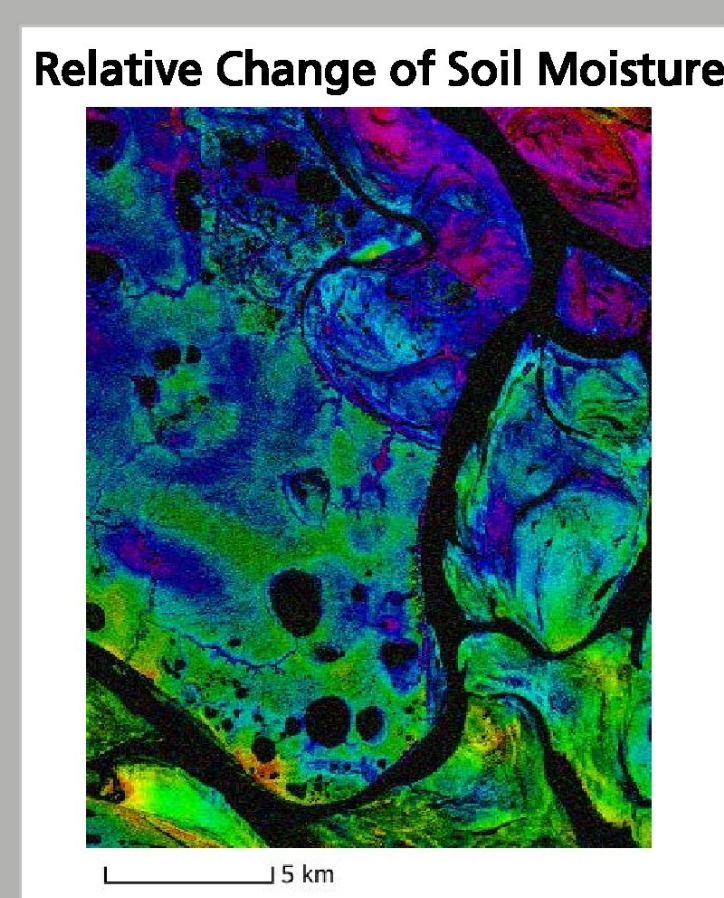
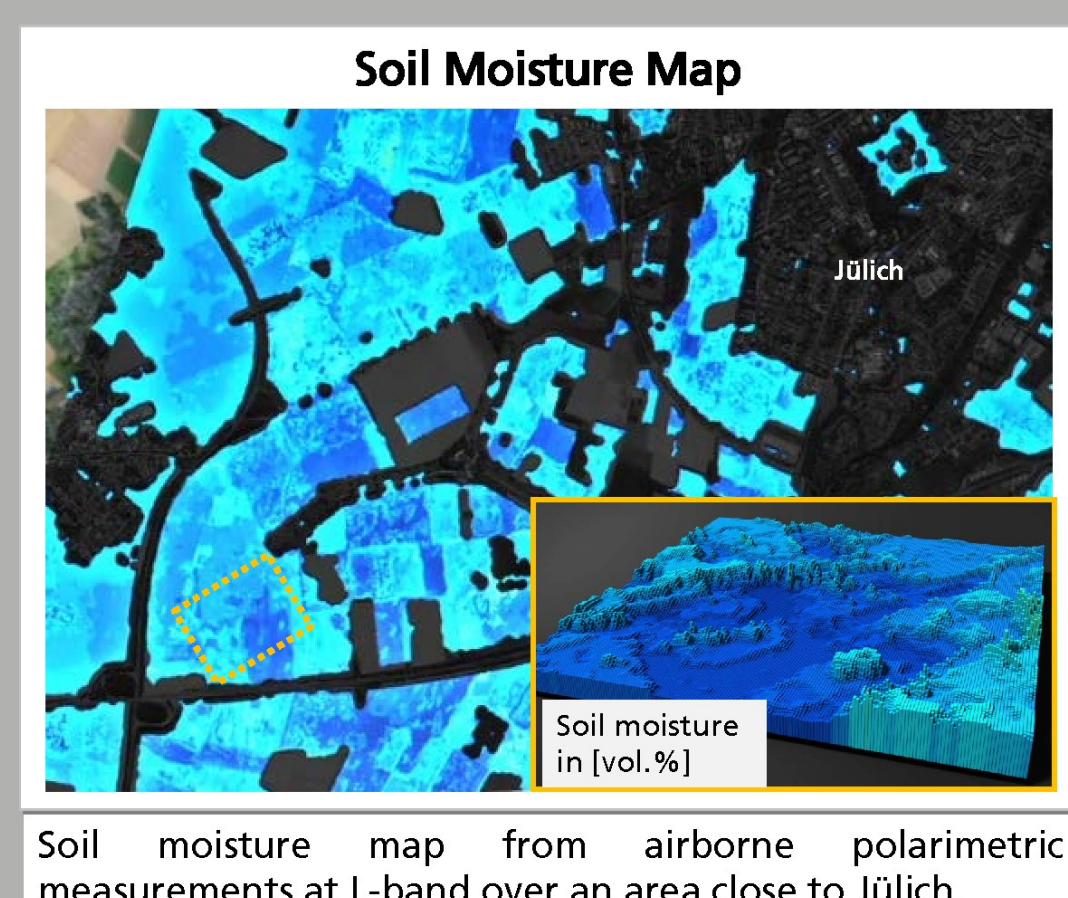
Pol-In-SAR

Interferometry in all polarimetric channels enables us to analyse both, the vertical structure and the type of scatter. Thus, it provides a tool to **separate** the **vegetation** signal from **ground** signal.

→ Multi-Baseline (Tomo-SAR) would help

Results

Feasibility studies of applications and definition of Tandem-L products in the frame of the “Helmholtz Alliance: Remote Sensing and Earth System Dynamics”



→ Advanced algorithms for product generation developed by scientists based on Tandem-L data may lead to the establishment of Hydrosphere products as Tandem-L mission products.