



Transregional Collaborative  
Research Centre 32

Patterns in Soil-Vegetation-Atmosphere-Systems  
Monitoring, Modelling and Data Assimilation

## Exploring small-scale patterns in a forest soil-vegetation-atmosphere system

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Objective



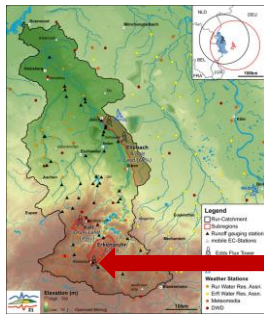
Improvement of the understanding of forest ecohydrological processes by analyzing small-scale patterns of forest water use and growth

### Research questions

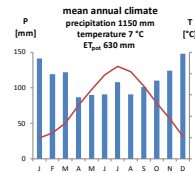
- [1] Which kind of small-scale patterns can we observe?
- [2] How are existing patterns inter-related?
- [3] How important are the observed patterns for the upscaling of processes and fluxes?



Study area



Catchment area of the River Rur and three selected sub-basins in the Eifel Region, Germany



Wüstebach catchment (38 ha)  
~ 70 years-old spruce plantation in the Eifel National Park

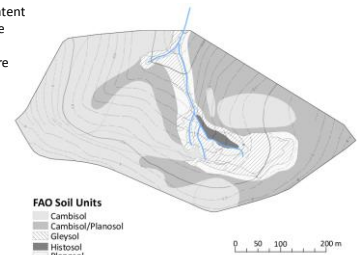


Small-scale patterns in the Wüstebach catchment



Short- and long-term monitoring of...

- Atmospheric conditions
- Soil water content
- Tree water use
- Tree growth
- Stand structure



FAO Soil Units  
Cambisol  
Cambisol/Planosol  
Gleysol  
Histosol  
Planosol



Small-scale patterns in the Wüstebach catchment



Short- and long-term monitoring of...

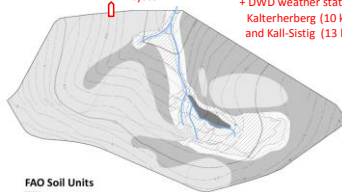
- Atmospheric conditions
- Soil water content
- Stand structure
- Tree water use
- Tree growth

eddy covariance system

+ TERENO weather station

Schönseiffen in 3 km distance

+ DWD weather stations  
Kalterherberg (10 km)  
and Kall-Sistig (13 km)



FAO Soil Units  
Cambisol  
Cambisol/Planosol  
Gleysol  
Histosol  
Planosol

0 50 100 200 m



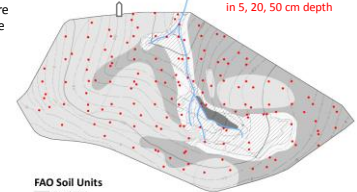
Small-scale patterns in the Wüstebach catchment



Short- and long-term monitoring of...

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TERENO SoilNet:  
volumetric soil moisture  
in 5, 20, 50 cm depth



FAO Soil Units  
Cambisol  
Cambisol/Planosol  
Gleysol  
Histosol  
Planosol

0 50 100 200 m



### Small-scale patterns in the Wüstabach catchment

Short- and long-term monitoring of...

- Atmospheric conditions
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- Stand structure**
- Tree water use
- Tree growth

tree density, diameters, height  
leaf area index

FAO Soil Units

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0 50 100 200m

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### Small-scale patterns in the Wüstabach catchment

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sap flow stations

FAO Soil Units

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0 50 100 200m

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### Small-scale patterns in the Wüstabach catchment

Short- and long-term monitoring of...

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tree rings

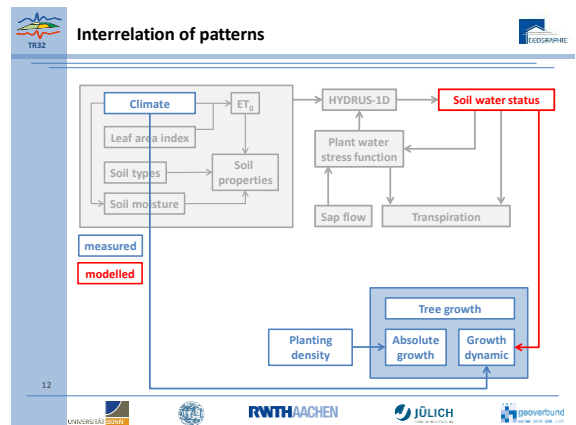
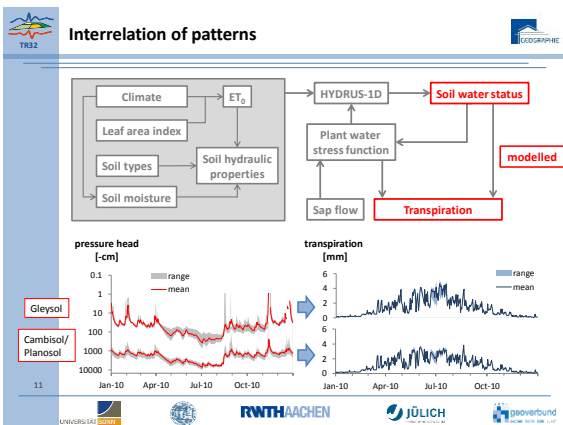
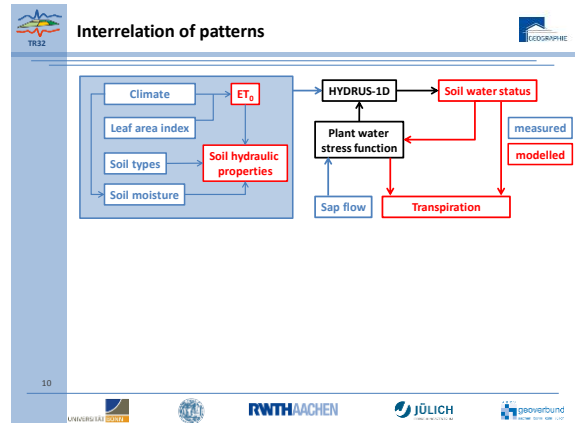
FAO Soil Units

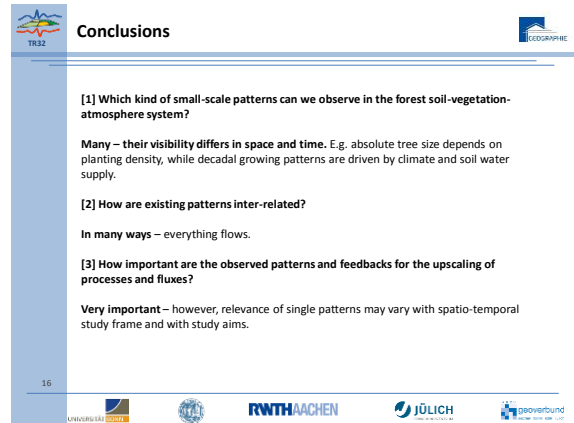
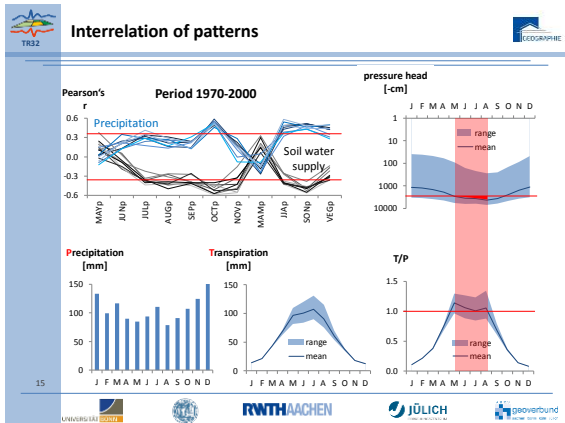
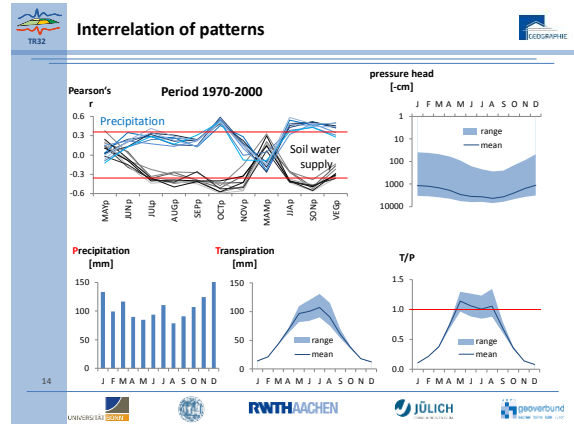
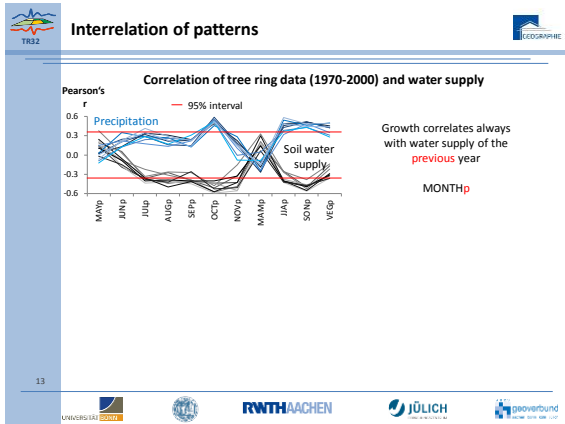
- Cambisol
- Cambisol/Planosol
- Gleysol
- Histosol
- Planosol

0 50 100 200m

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Thank you!

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