

Strong correlation between vegetation backscatter and root zone soil moisture over a dry summer period

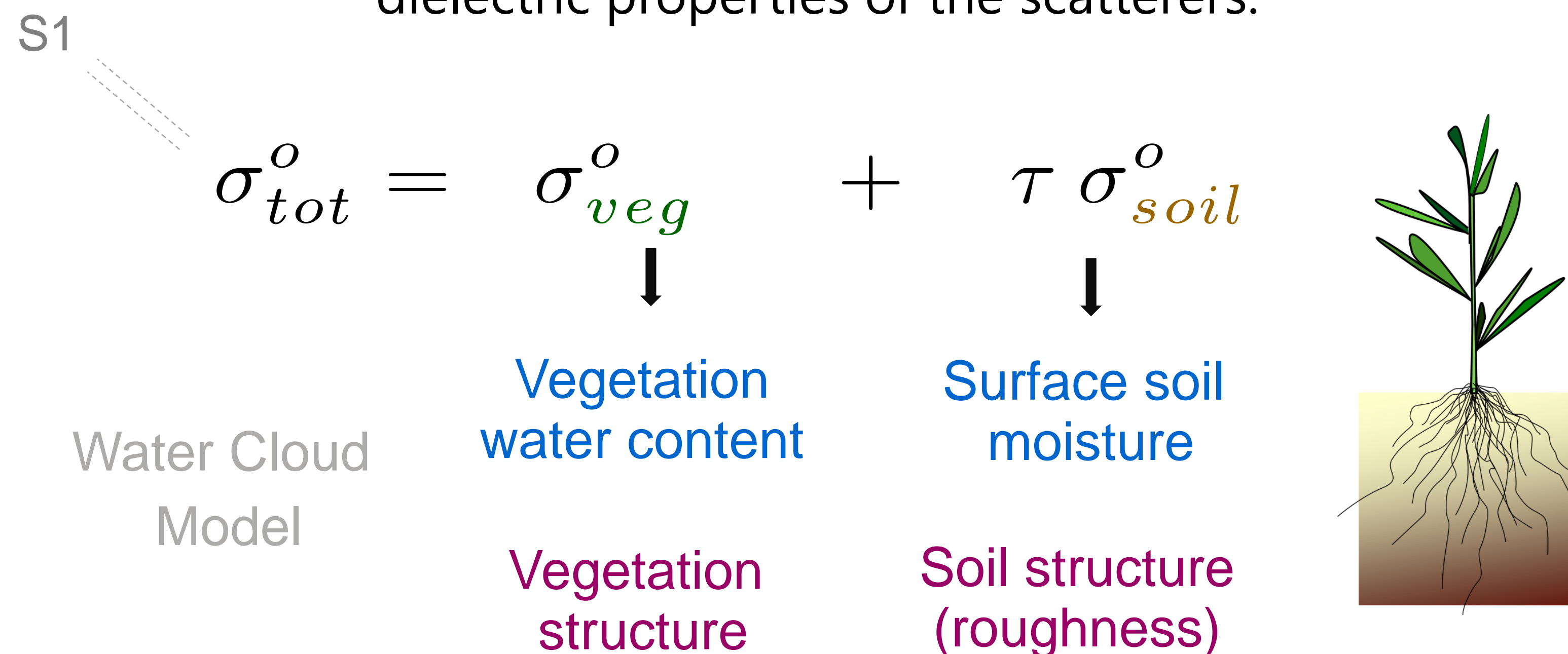
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Radar backscatter (e.g. from Sentinel-1) can be decomposed into the soil and vegetation contributions

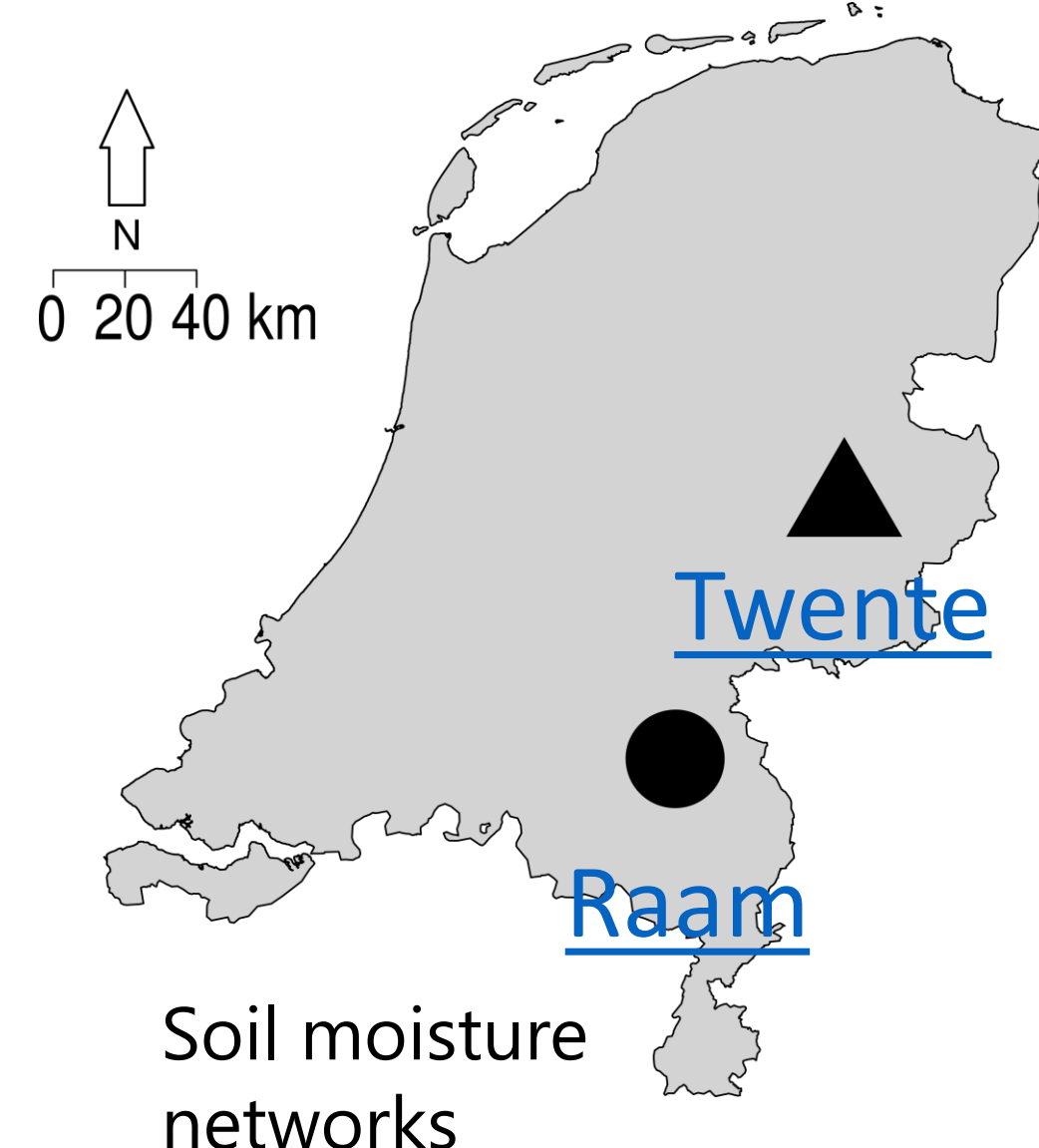
Each component is influence by geometric and dielectric properties of the scatterers.



Both components can potentially reflect root zone soil moisture because:

- Soil backscatter measures surface soil moisture which influences how much water flows into the subsurface.
- Vegetation backscatter indicates vegetation water content which is highly dependent on soil water content. From agronomy, pre-dawn soil and leaf water potential are in equilibrium.

II. study sites



Corn fields within the two networks were investigated over the growing seasons (June-Sept.) of 2016 - 2018

Datasets:

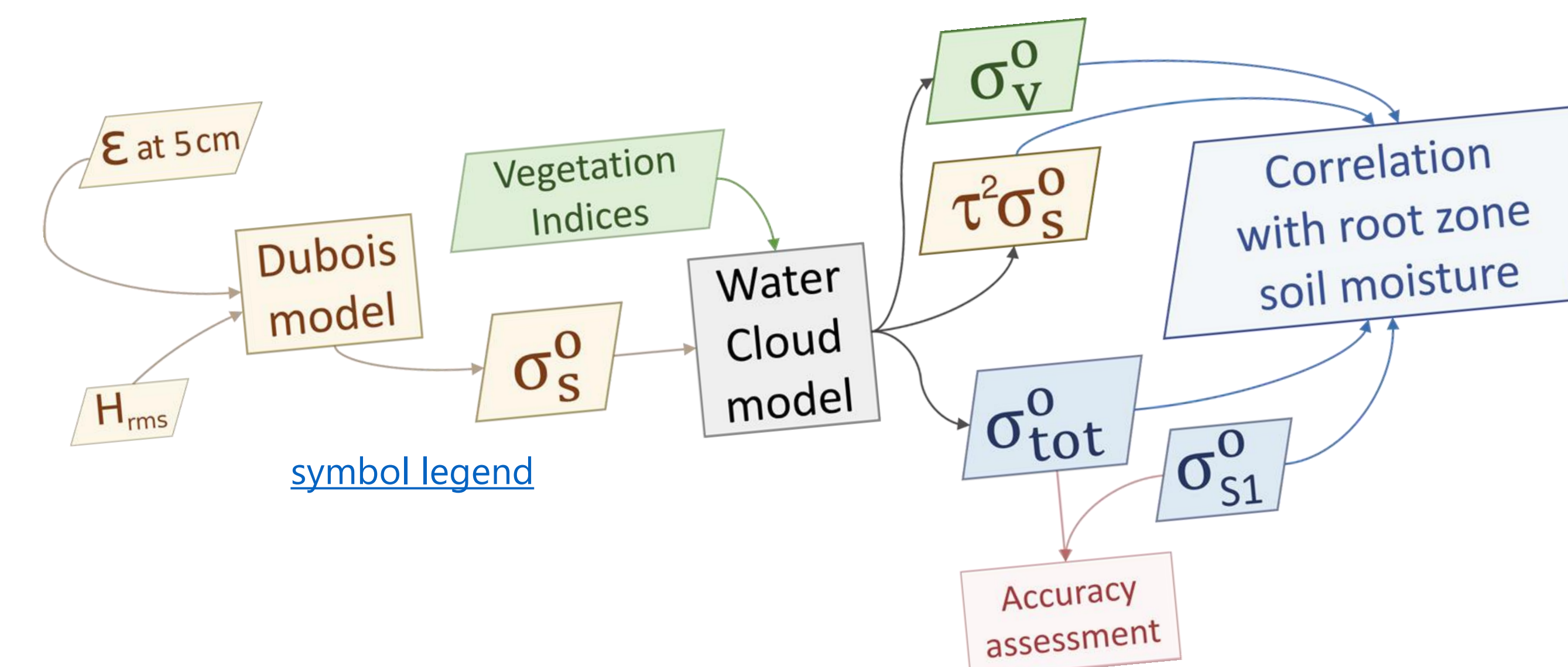
- Sentinel-1 VV backscatter
- Surface soil moisture at 5 cm
- Zone-weighted depth-averaged root zone soil moisture up to 40 cm
- Vegetation index: LAI

2018 summer drought lowered soil moisture levels such that surface is de-coupled with the subsurface.

Surface soil moisture, and hence soil backscatter did not reflect root zone conditions.

[>>> Link to extended presentation](#)

III. workflow



For each dataset, the average values from all corn fields for every Sentinel-1 overpass were used for analysis.

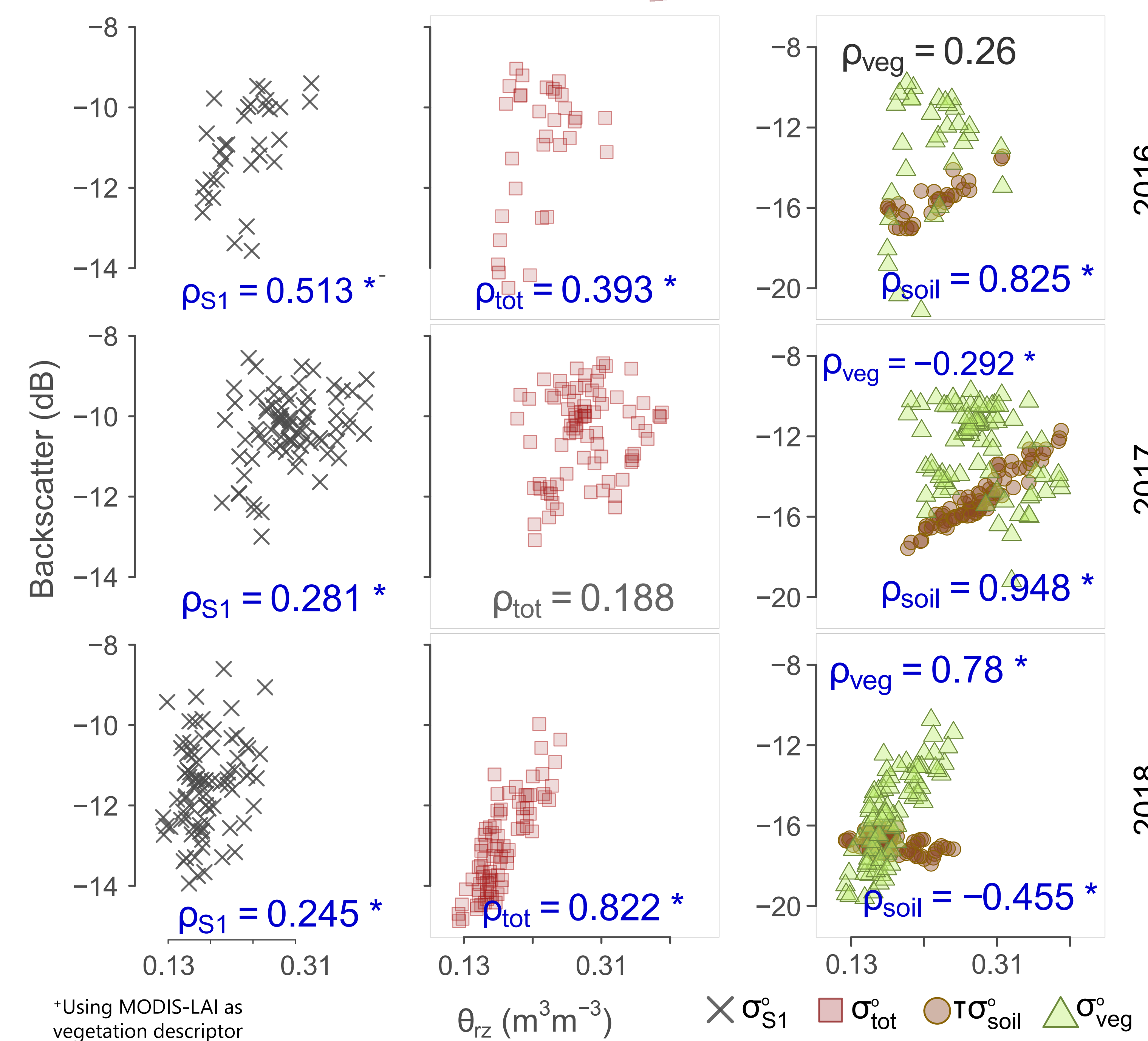
IV. main findings

σ_{soil}^o

Strong positive correlation with root zone soil moisture in 2016 and 2017

σ_{veg}^o

Strong positive correlation with root zone soil moisture in 2018



Meteorological conditions influenced surface - subsurface coupling and determined which radar backscatter component reflected root zone soil moisture

Significant correlation in blue and marked with *

