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Machine learning assessments of soil drying

Title	Machine learning assessments of soil drying
Title (native language)	
Category	• Farm Management Information System
Short summary for practitioners (Practice abstract) in English)	This work models the wetting/drying process through machine learning algorithms fed by hydrologic data – remotely assessing soil conditions using only publicly-accessible information. Classification trees, k-nearest-neighbors, and boosted perceptrons deliver statistical soil dryness estimates at a site located in Urbana, IL. The k-nearest-neighbor and boosted perceptron algorithms both performed with 91–94% accuracy, with most misclassifications falling within calculated margins of error. These analyses demonstrate that reasonably accurate predictions of current soil conditions are possible with only precipitation and potential evaporation data. These two values are measured throughout the continental United States and are likely to be available globally from satellite sensors in the near future. Through this type of approach, agricultural management decisions can be enabled remotely, without the time and expense of on-site visitations or extensive ground-based sensory grids
Short summary for practitioners	
Website	
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Soil management / functionality
Additional keywords	Soil drying; Field readiness; Machine learning; Soil moisture; Decision support

Geographical location (NUTS)	EU
Other geographical location	Global
Cropping systems	
Field operations	Crop and soil scouting
SFT users	Farmer | Contractor
Education level of users	All
Farm size (ha)	0-2 | 2-10 | 10-50 | 50-100 | 100-200 | 200-500 | >500

Scientific article

Title	Machine learning assessments of soil drying for agricultural planning
Full citation	Coopersmith, E.J.; Minsker, B.S.; Wenzel, C.E.; Gilmore, B.J. (2014). Computers and Electronics in Agriculture, DOI:10.1016/j.compag.2014.04.004

Effects of this SFT

Productivity (crop yield per ha)	No effect
Quality of product	No effect
Revenue profit farm income	No effect
Soil biodiversity	No effect
Biodiversity (other than soil)	No effect
Input costs	No effect
Variable costs	No effect
Post-harvest crop wastage	No effect
Energy use	Large decrease
CH4 (methane) emission	No effect
CO2 (carbon dioxide) emission	No effect
N2O (nitrous oxide) emission	No effect
NH3 (ammonia) emission	No effect
NO3 (nitrate) leaching	No effect
Fertilizer use	No effect
Pesticide use	No effect
Irrigation water use	No effect
Labor time	Some decrease
Stress or fatigue for farmer	Some decrease
Amount of heavy physical labour	No effect
Number and/or severity of personal injury accidents	No effect
Number and/or severity of accidents resulting in spills property damage incorrect application of fertiliser/pesticides etc.	No effect
Pesticide residue on product	No effect
Weed pressure	No effect
Pest pressure (insects etc.)	No effect
Disease pressure (bacterial fungal viral etc.)	No effect

Information related to how easy it is to start using the SFT

This SFT replaces a tool or technology that is currently used. The SFT is better than the current tool	no opinion
The SFT can be used without making major changes to the existing system	no opinion
The SFT does not require significant learning before the farmer can use it	agree
The SFT can be used in other useful ways than intended by the inventor	no opinion
The SFT has effects that can be directly observed by the farmer	agree
Using the SFT requires a large time investment by farmer	disagree
The SFT produces information that can be interpreted directly	no opinion

View this technology on the Smart-AKIS platform

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